User's Manual

NovaCLB-Screen-Full-screen Calibration System

Rev1.0.0 NS140000002

Contents

1 Introduction

1.1 Why Pixel Level Calibration

Brightness / Color uniformity is of the most important factors that affect the image quality of a full color LED display. Because of the limitations of the manufacturing process, including system structure design, LED lights selection, electronic components welting, system cooling, LED brightness decaying and many others, LED displays suffer the brightness / color uniformity loss, which is also the most serious problem of this field.

Facing this fact, Nova pixel level calibration system does not intervene the manufacturing processing of a LED display to reduce its brightness / color uniformity. Instead, it performs brightness / color adjustment to the display after it has been completely produced. By adjusting the brightness / color of each LED light according to the software analytical results from the measured brightness / color values of the LED lights, Nova pixel level calibration system can help the LED display acquiring perfect uniformity.

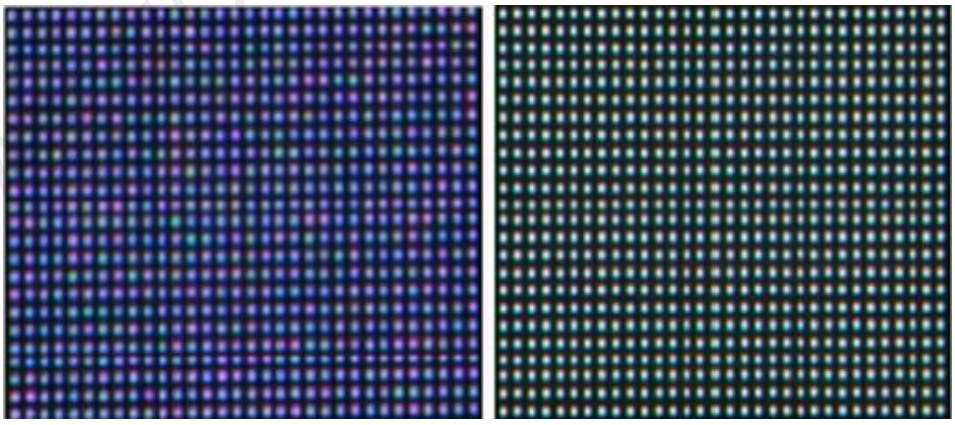


Fig.1-1 The LED display effects comparison before and after calibration

NovaCLB is applicable for the following two occasions:

- Factory single cabinet pixel level calibration (Factory calibration). Correct each cabinet on the production line to ensure good brightness / color uniformity of the cabinets when produced.
- Field LED display pixel level calibration (Full-screen calibration). Perform calibration for a LED display at where it locates to improve its brightness / color uniformity.

Factory calibration is more efficient and lower in cost than Full-screen calibration. But for cabinets of which the LED lights optical axis directions consistency is not well managed, results of factory calibration will not be as good as that of filed calibration. When doing factory calibration, the matching NovaCLB-Cabinet is needed.

Full-screen calibration requires engineers to be presence and Full-screen installation of calibration instruments. And what' s more, Full-screen calibration can only be performed only at night when it' s dark. Despite its complexity and low efficiency (compared with factory calibration), Full-screen calibration can greatly improve the brightness / color uniformity of a LED display and thus results in amazing image quality of the display. When doing Full-screen calibration, the matching NovaCLB-Screen is needed.

1.2 Core Advantages of NovaCLB-Screen

- Camera calibration technology enabling accurate brightness / color measurement;
- Precise calibration coefficients up to 16bits resulting in outstanding calibration performance with brightness variation less than ±1% and color variation less than 0.003;
- Be capable of eliminating color diversity of LED lights from different manufacturing batches;
- Be capable of eliminating brightness / color diversity between subareas or cabinets;

- Arc shape and irregular shape LED display calibration supported;
- Oblique cabinet calibration on production lines supported;
- Supporting automatic calibration for the replaced module;
- Perfect compatible with LED control systems;
- Specific calibration algorithm enabling perfect calibration for low gray level range;
- Close loop intelligent calibration resulting in easy and high efficiency calibration. One LED display, one person; 25 minutes,600K pixels;
- Adopt RGB to begin the collection mechanism and collection-processing mechanism at the same time during the calibration process so as to improve the efficiency;
- Support correction to the boundary difference between partitions so as to enable smooth transition between partitions;
- No extra power supply required.

1.3 System structure

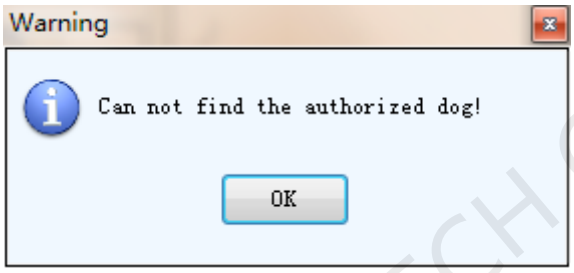
Fig. 1-2 System structure(NovaLCT)

Fig. 1-3 System structure(NovaPro)

2 Author manage

NovaCLB-Screen adopts the management methods of encryption lock and authorized file binding authorization; and every dongle corresponds to one authorized file, which is combined with the file authorization.

When the software is operated, the following window will appear; click OK to open the software, where the software is not authorized and it cannot be used normally.



Insert dongle to the USB port of the computer; click menus "Author"→ "Author manage" on the main interface; enter to the Authorization manage window, click 

to import the authorized file (in the disk) corresponding to the dongle.

Multiple authorized file can be imported, thus, the software (after being copied to other computers) can be used by inserting the dongle.

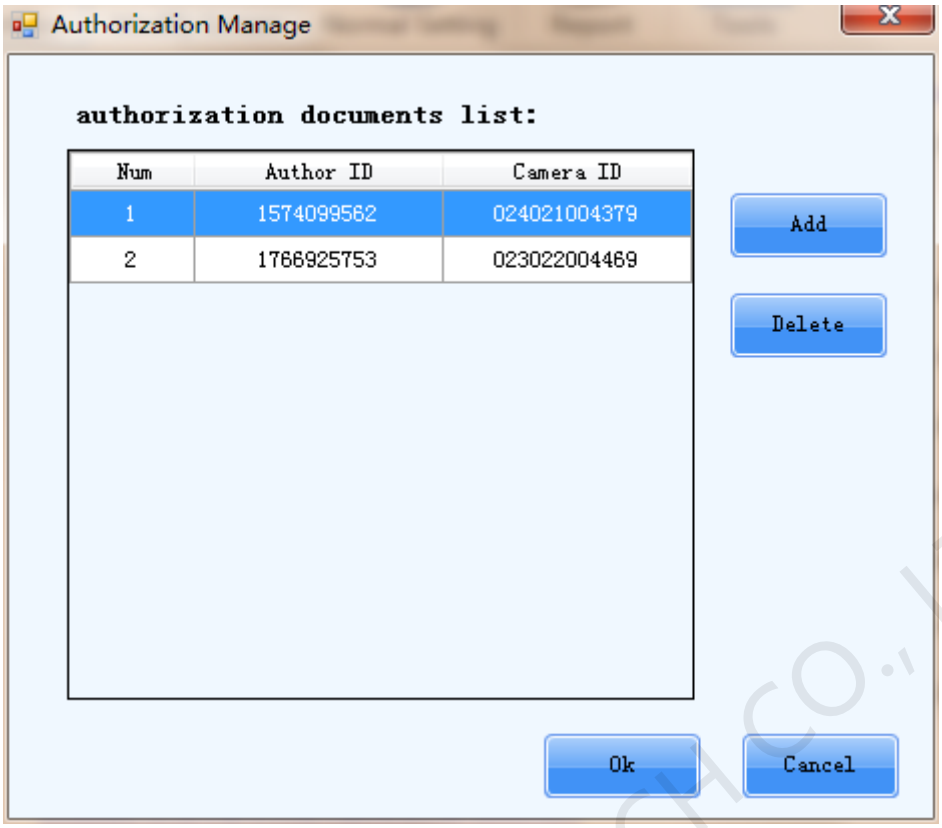


Fig.2-1Authorization management

3 Full-Screen Calibration

3.1 Operation process

If normal partition mode is selected during partition calibration, the following procedure may be adopted to perform calibration (wherein, " Eliminate the boundaries of the partitions "is optional. In case of partition correction with good results, modify screen may be omitted):

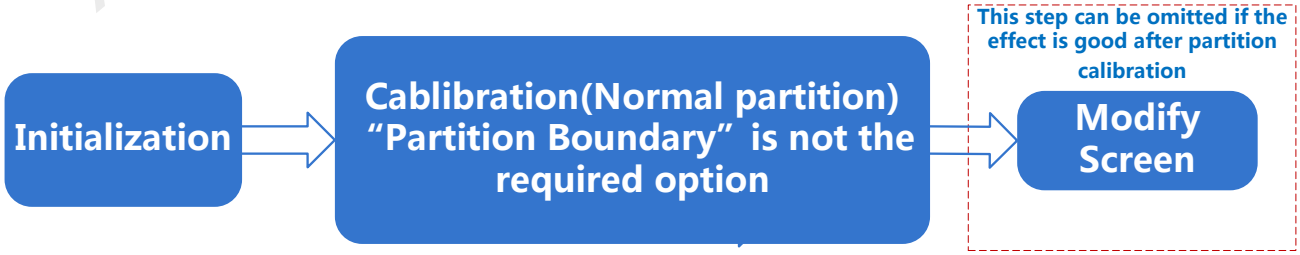


Fig. 3-1 Software Operation Process (One)

If large partition mode is selected during partition correction, the following process should be

adopted to perform calibration:

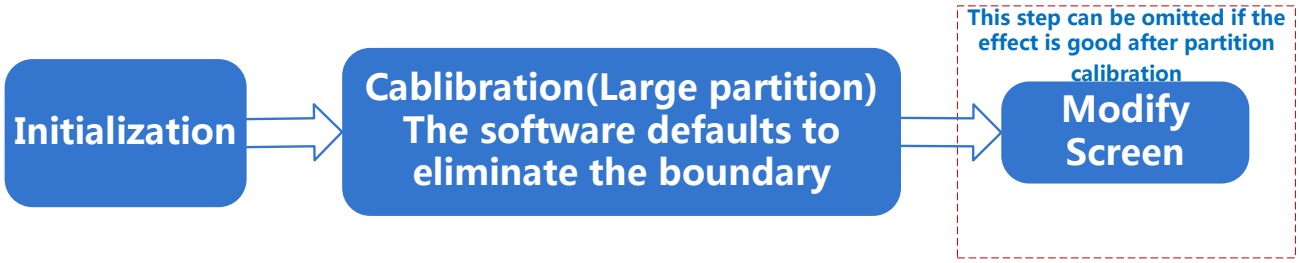


Fig. 3-2 Software Operation Process (Two)

✧ **Initialization**

This interface is designed to initialize a series of calibration parameters, including the communication settings, databases, display information, the original brightness / color parameters and the expected brightness / color, etc.

✧ **Partitions Calibration**

This interface is committed to guide customers to perform pixel level calibration on each LED light, which signally improve the display uniformity.

Partition Calibration can be divided into normal partition and large partition. Calibrated area of the large partition is several times of the normal partition, thus the large partition is applicable for calibration of large display screen.

✧ **Partition Boundary**

Eliminate the differences among partitions.

✧ **Modify screen**

When the partition calibration is totally completed, then it comes to the modify screen. modify screen perfectly eliminate the differences among the partitions, which can make the screen be a flawless whole.

3.2 Calibration Initialization

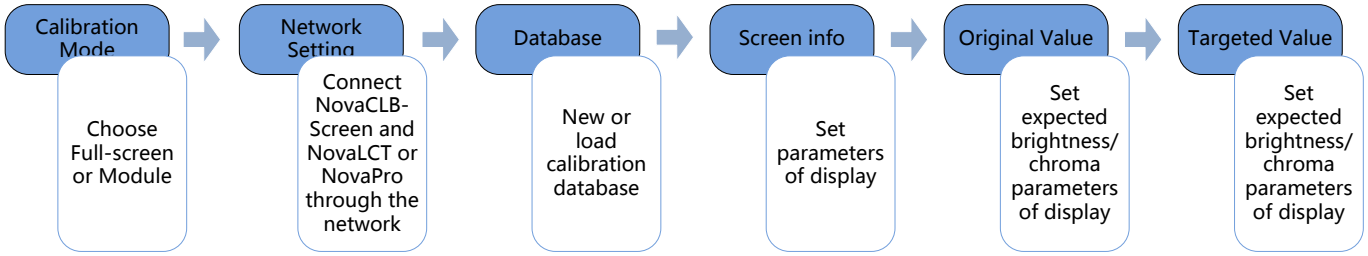


Fig. 3-3 Flow chart of Calibration Initialization

3.2.1 Calibration Mode

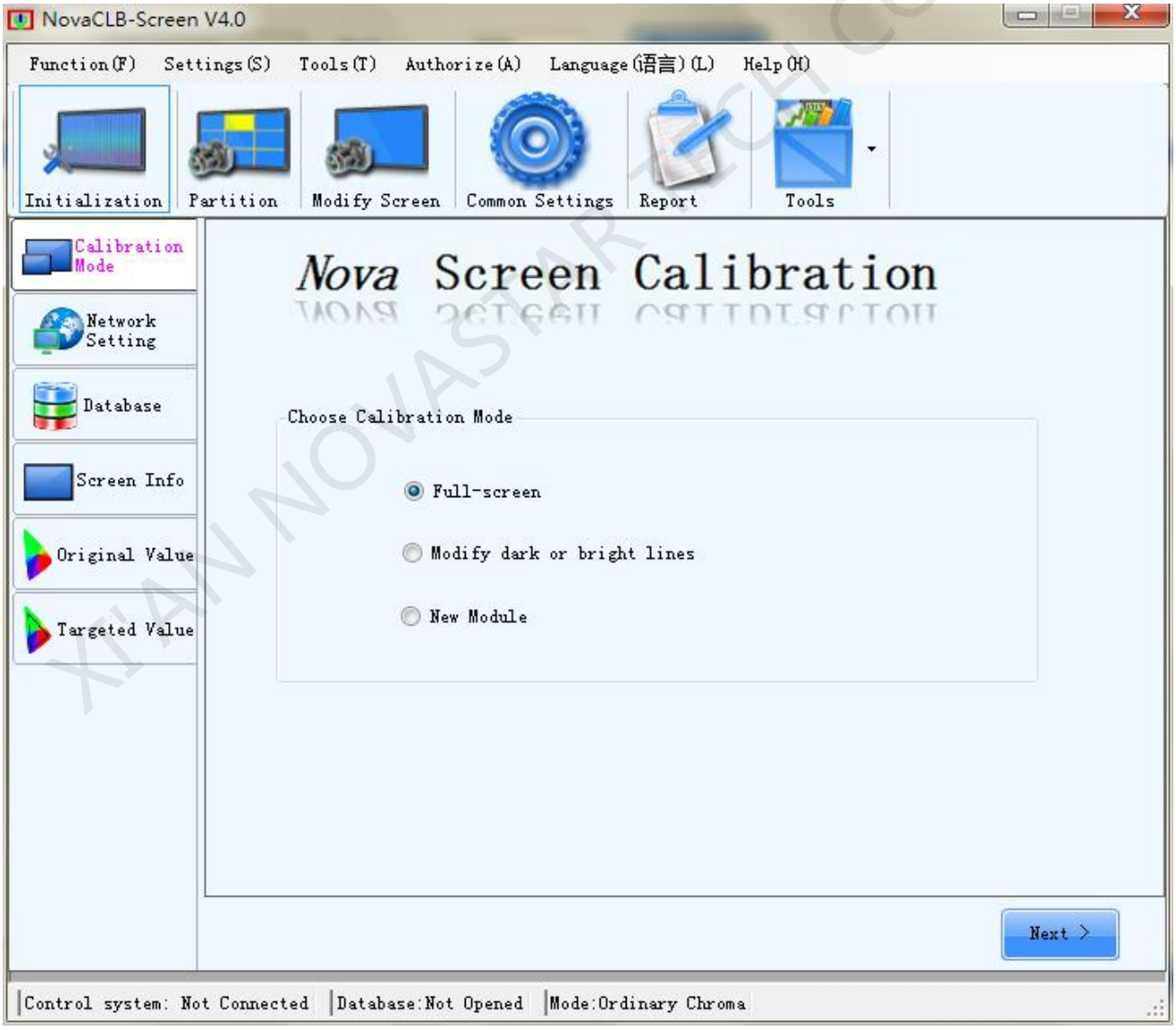


Fig. 3-4 Choose calibration mode

3.2.2 Network Settings

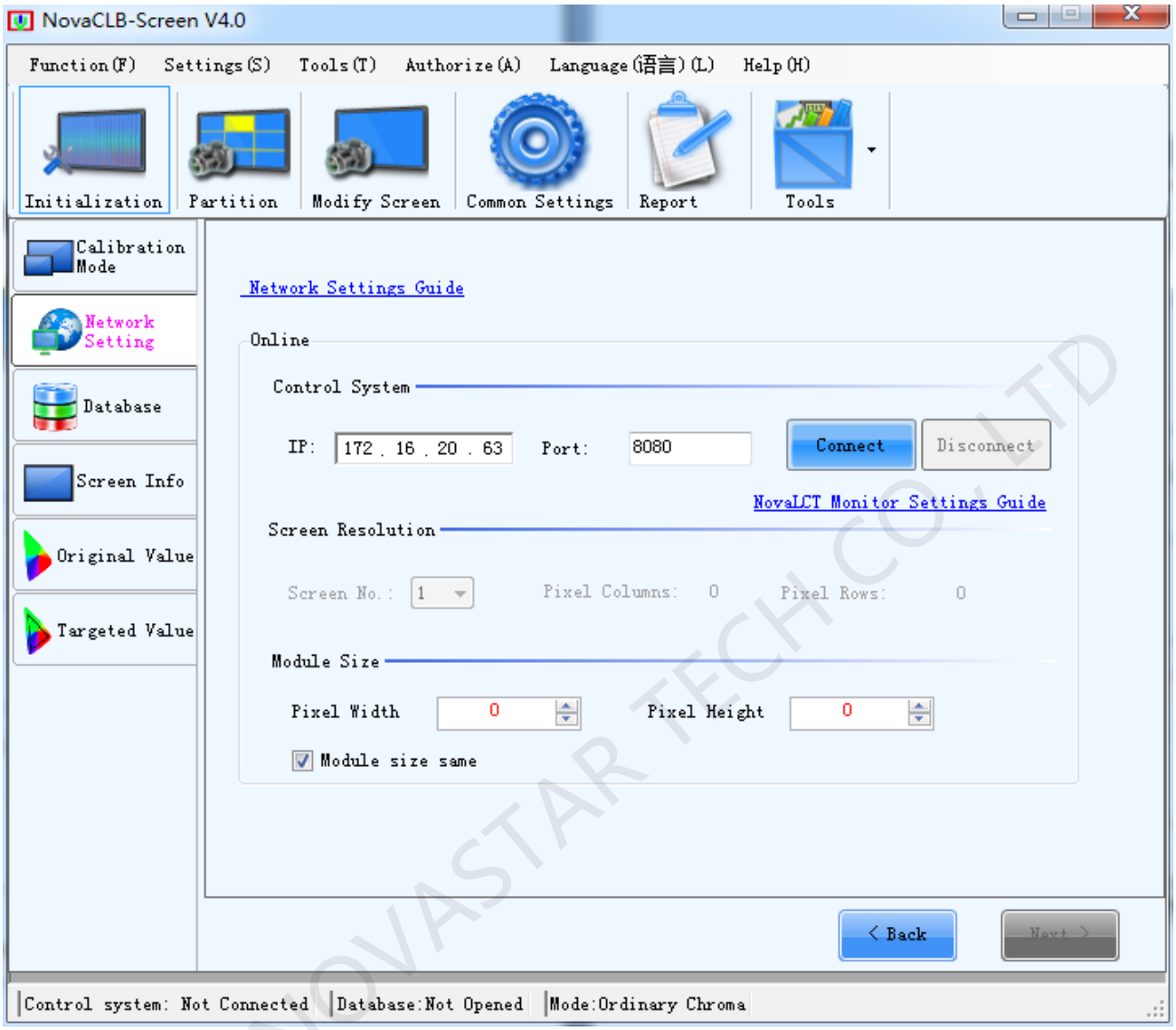


Fig. 3-5 Network Settings Interface of Calibration Initialization

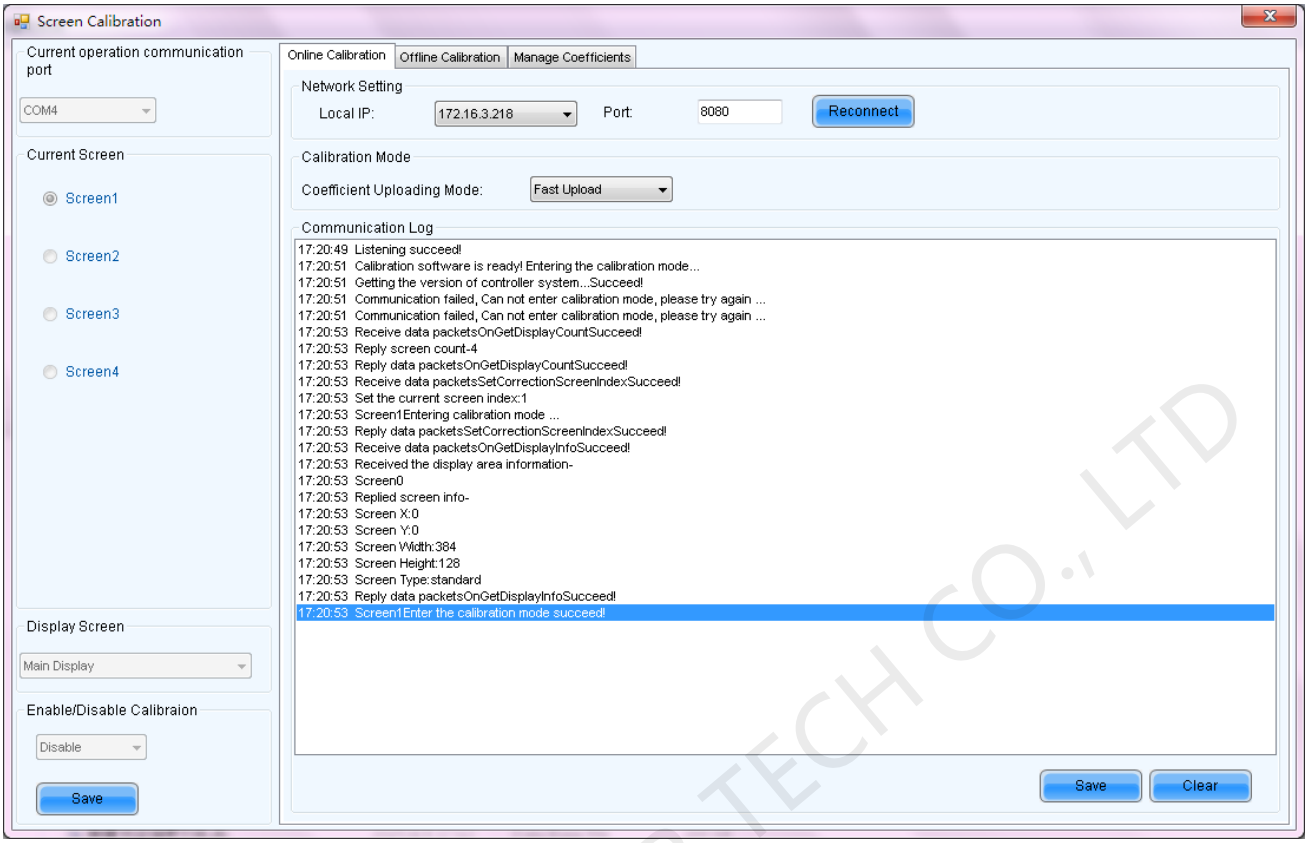
✧ Control system Connection

NovaCLB-Screen must be used cooperate with Control system (NovaLCT or Novapro) to calibration the display.

➢ NovaLCT Connection

Ensure that the NovaCLB-Screen computer can communicate with the NovaLCT computer well, fill the IP and port (The default is 8080, can be modified) from NovaLCT in the location of IP and port from NovaCLB-Screen, then click "Connect" button. Fig.3-6 will show up, and the Connection is

done.



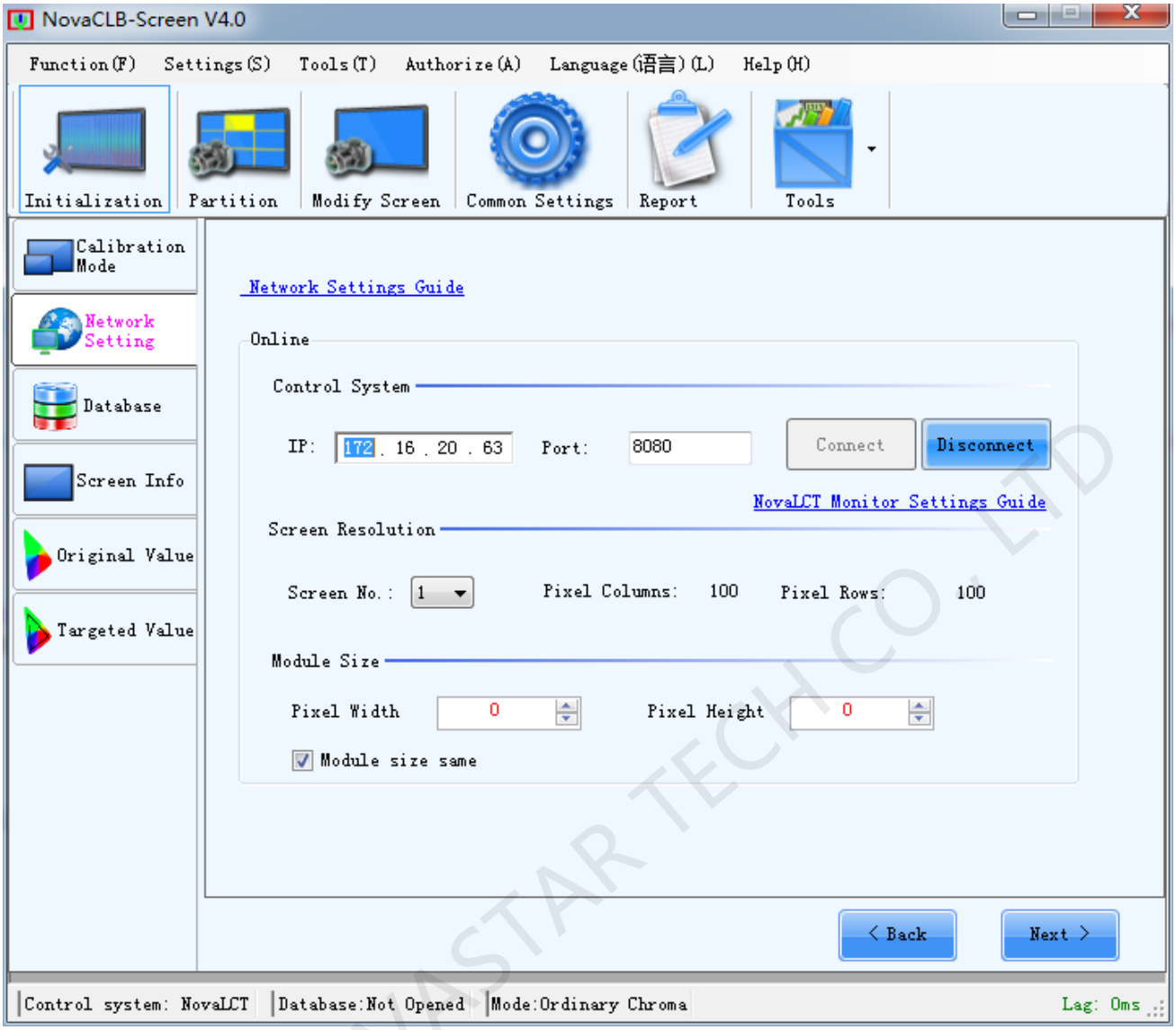


Fig. 3-6 Prompt message from NovaLCT when connection is successful

If connection is failed, users could click "Network Setting Guide" showed in fig.3-6.

- NovaPro Connection

Ensure that the NovaCLB-Screen computer can communicate with the NovaPro well, input the IP and port (The port is set to 5200) of NovaPro or NovaCLB-Screen, then click "Connect" button. Fig.3-7 will show up, and the Connection is done.

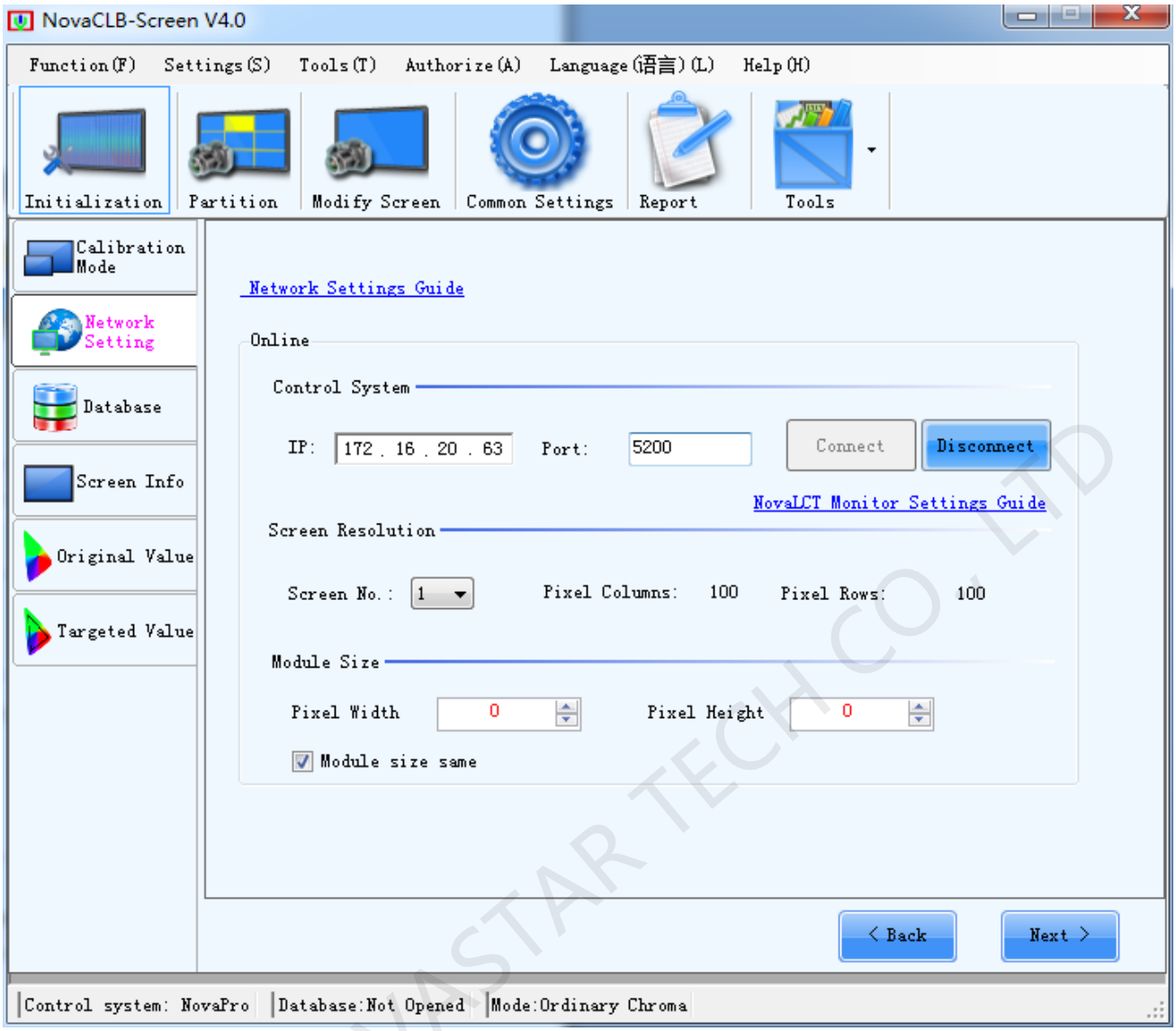


Fig. 3-7 Prompt message from NovaPro when connection is successful

✧ Screen Resolution

The resolution of display is the width and height in the pixel level.

After NovaCLB-Screen is connected with NovaLCT or NovaPro successfully, the bottom of interface will show display count and the corresponding resolution of connected NovaLCT or NovaPro. Users could choose display number as needed, the default value is the first one.

✧ Module Size

Check "Module size same" and set the module width and module height of module if the size of all module are same. The function of **Modify dark or bright lines** will be not supported if the size

of module is not same.

3.2.3 Database

A new database or the existing database can be used; and the database is used for saving information of calibration coefficient, calibration time, screen size, etc. it shall be kept properly.

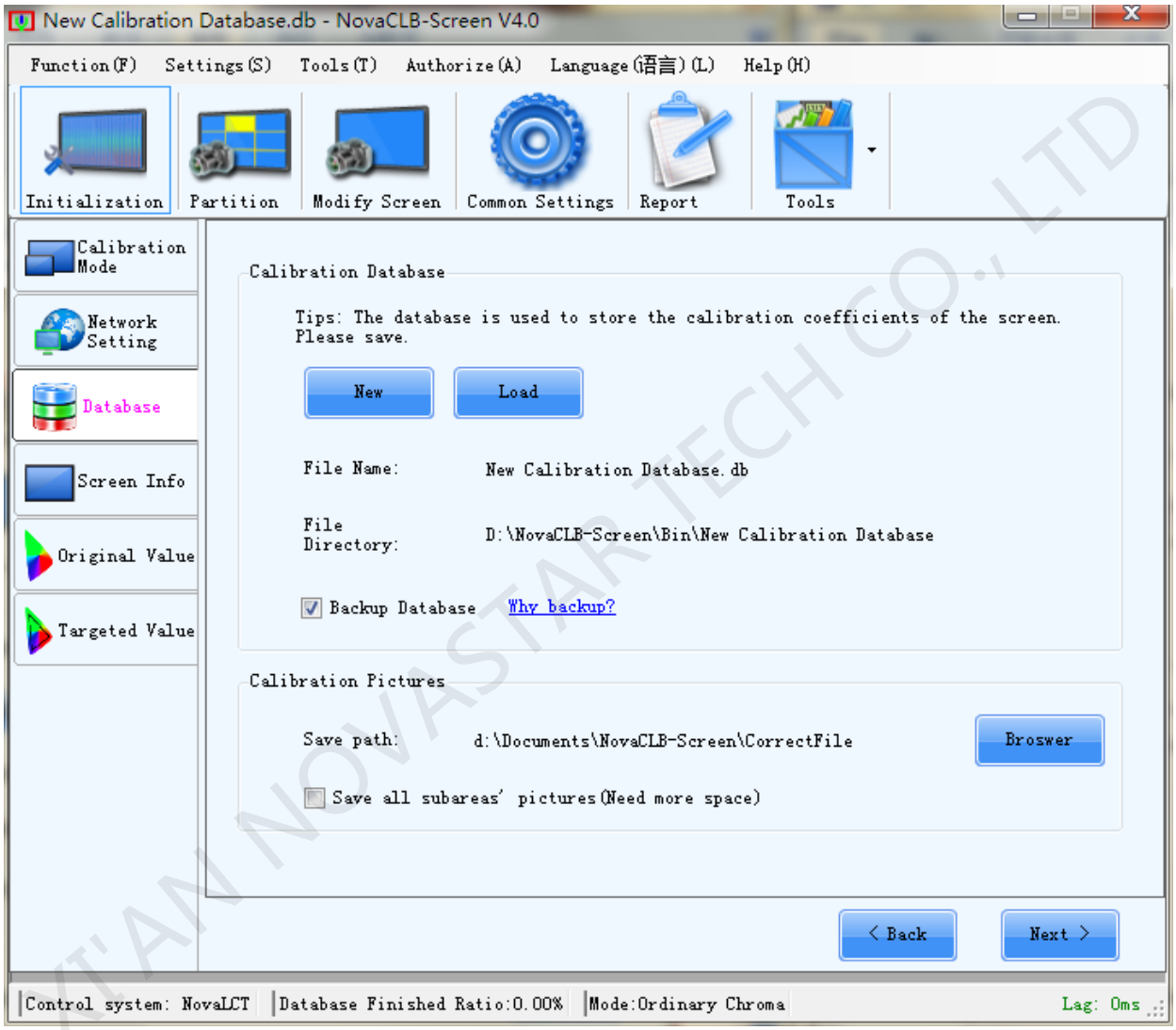
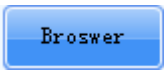


Fig. 3-8 Database Interface of Calibration Initialization

Calibration Pictures

Click 

to set the position where the collected images are saved during calibration. For example, check "Save all subareas' pictures" to save the images in all partitions; un-checking the option will only save the images in current partition in default setting.

3.2.4 Screen Information

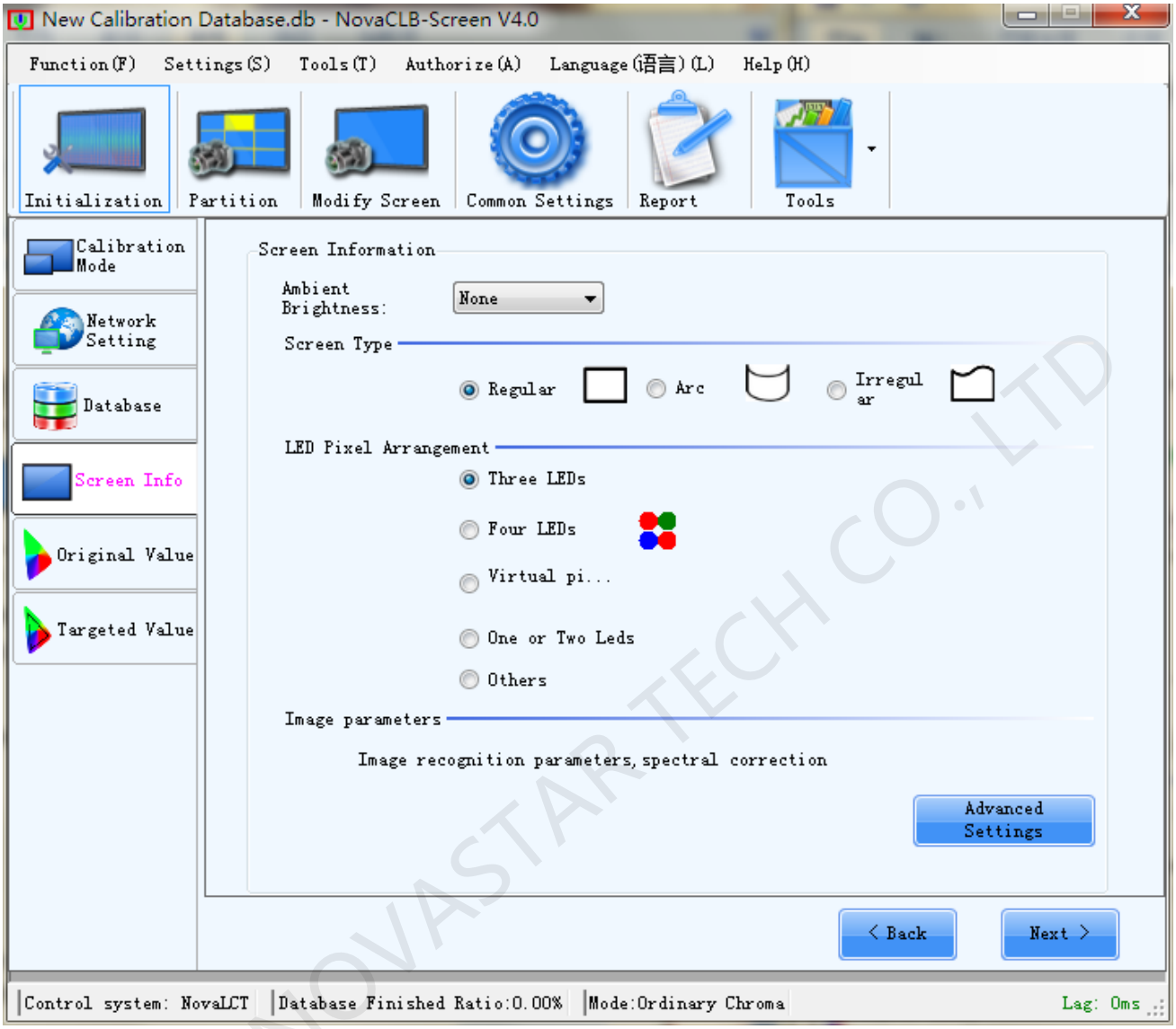


Fig. 3-9 Display Information Interface of Calibration Initialization

Ambient Brightness

Ambient Brightness is the brightness of surrounding environment when calibrating. In general, the brightness is "low" at night, its "High" at nightfall or cloudy day. It is unsuited to calibrate in sunny day.

Screen Type

The type of Screen can be divided as "Regular", "Arc", "Irregular". "Regular" means it is a common

rectangular lane display. "Arc" means a rectangular arc display, including inner arc and outer arc. The else are "Irregular".

Pixel Arrangement

Pixel Arrangement is the count of every pixel, the common ones are three LEDs arrangement, Virtual pixel of 3 led, four LEDs arrangement, etc.

Advanced settings

The above four terms are the basic parameters information of display. Click "Advanced Settings" button to get in advanced settings interface.

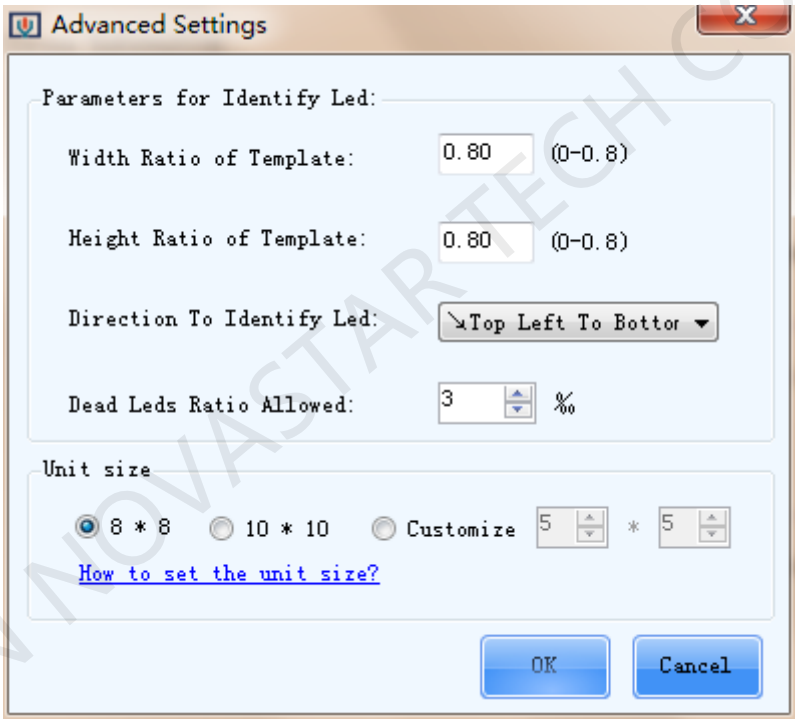


Fig. 3-10 Advanced Settings Interface of Display Information

Width and Height Ratio of Template

Identify template for LED, default values are suggested.

Direction To Identify Led

The Direction can be divided into four diagonal directions which are from four angles of rectangle. It is used when identify LED, the default direction is the diagonal from top left to bottom right.

When the LED of top left angle can't display normally, please change the direction. For example, users try to identify LED from bottom right when the first row or the first column is covered.

Dead LEDs Ratio Allowed

If the LEDs which can't be identified in calibrating zone is greater than the ratio, the calibrating flow would stop and some prompt messages will be presented. Please be sure whether the "dead lights are too much" or "some LED pixels are covered" is appeared. If the problem can't be solved, users could turn up this ratio to calibrate forcibly.

Spectrum Revise Mode

In normal conditions, users could choose mode 1. In Special conditions, if there is still some spots uniformed in the screen, users could choose mode 2 or mode 3.

Unit size

If pixels of columns and rows of a LED display can be divided by 8, please select 8*8. If pixels of columns and rows of a LED display can be divided by 10, please select 10*10.

3.2.5 Original Brightness and color Measurement

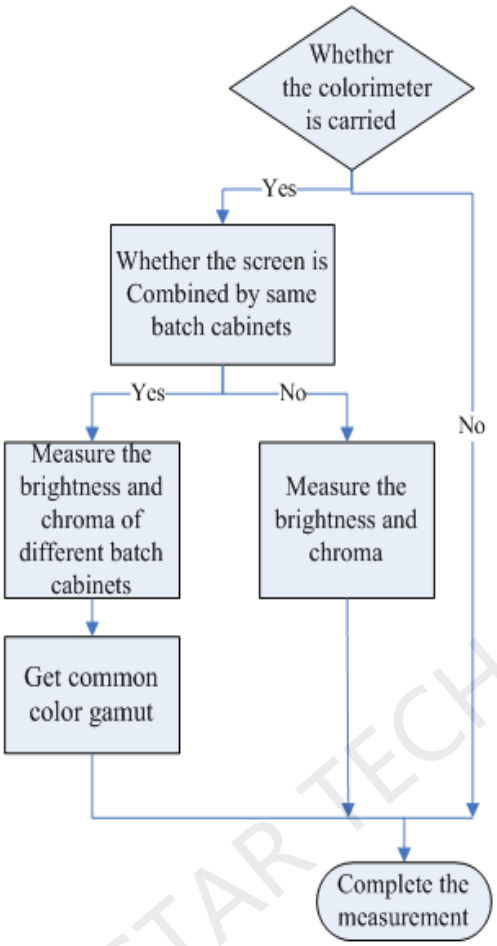


Fig. 3-11 Flow chart of Measure Original Brightness and Color

Original brightness and color is the original brightness and color parameters information of the display to be calibrated. It' s important to set these parameters correctly for the result of calibration.

1) Whether the Colorimeter is Carried

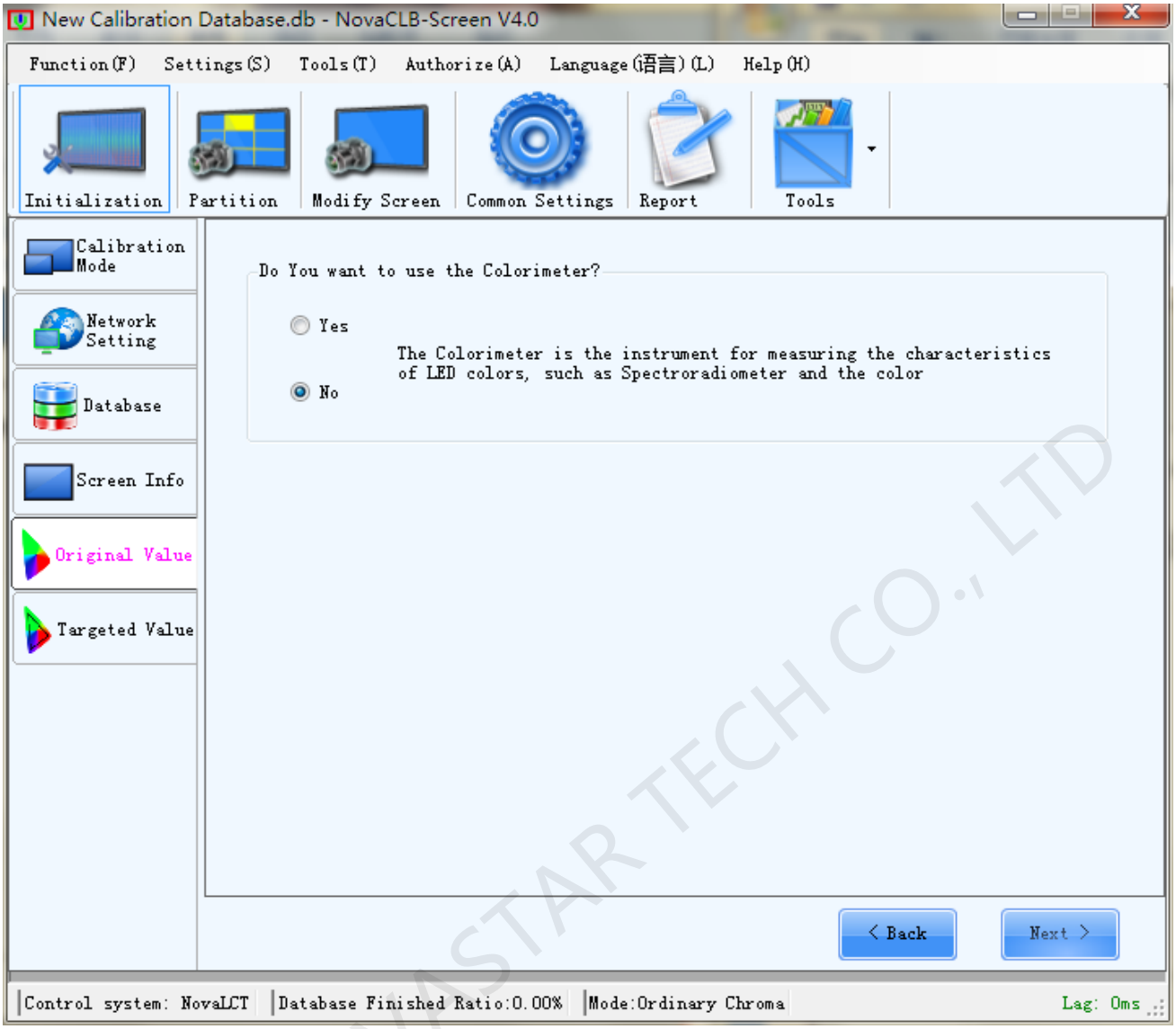


Fig. 3-12 Original Brightness and Color Interface of Calibration Initialization

Do You Have The Colorimeter

The colorimeter here means instruments that can measure LED color, like: light gun, color analyzer, Spectral radiation brightness meter, etc. Users can choose as the condition of whether the colorimeter is carried. It' s recommended to use colorimeter the when calibration.

2) Whether the Screen is Combined by the Same Batch of Cabinets

If the colorimeter is not carried, choose "No", the software would get into "Target Brightness and Color" interface, otherwise, choose "Yes", Click "Next" to get into batches of cabinets for display choosing interface, as shown in Fig 3-13.

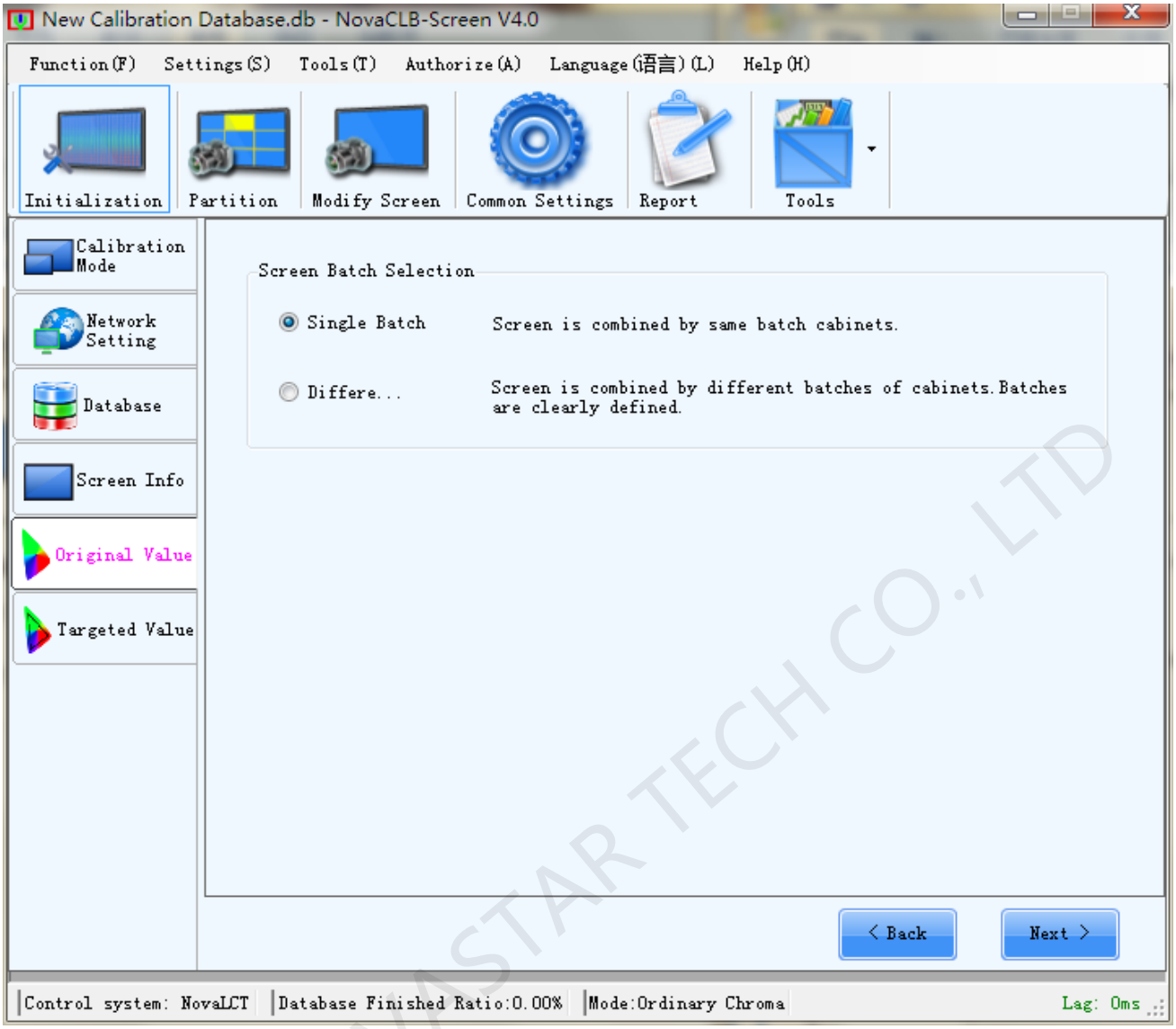


Fig. 3-13 Batches of Cabinets for Display Choosing Interface

The Same Batch

The screen is combined by the same batch of cabinets.

Different Batches

The screen is combined by different batches of cabinets. The difference between cabinets is clear.

In this condition, users need to measure brightness and color of different batches of cabinets.

After choosing, Click "Next", get into the detail measurement interface.

Screen is Combined by the Same Batch of Cabinets

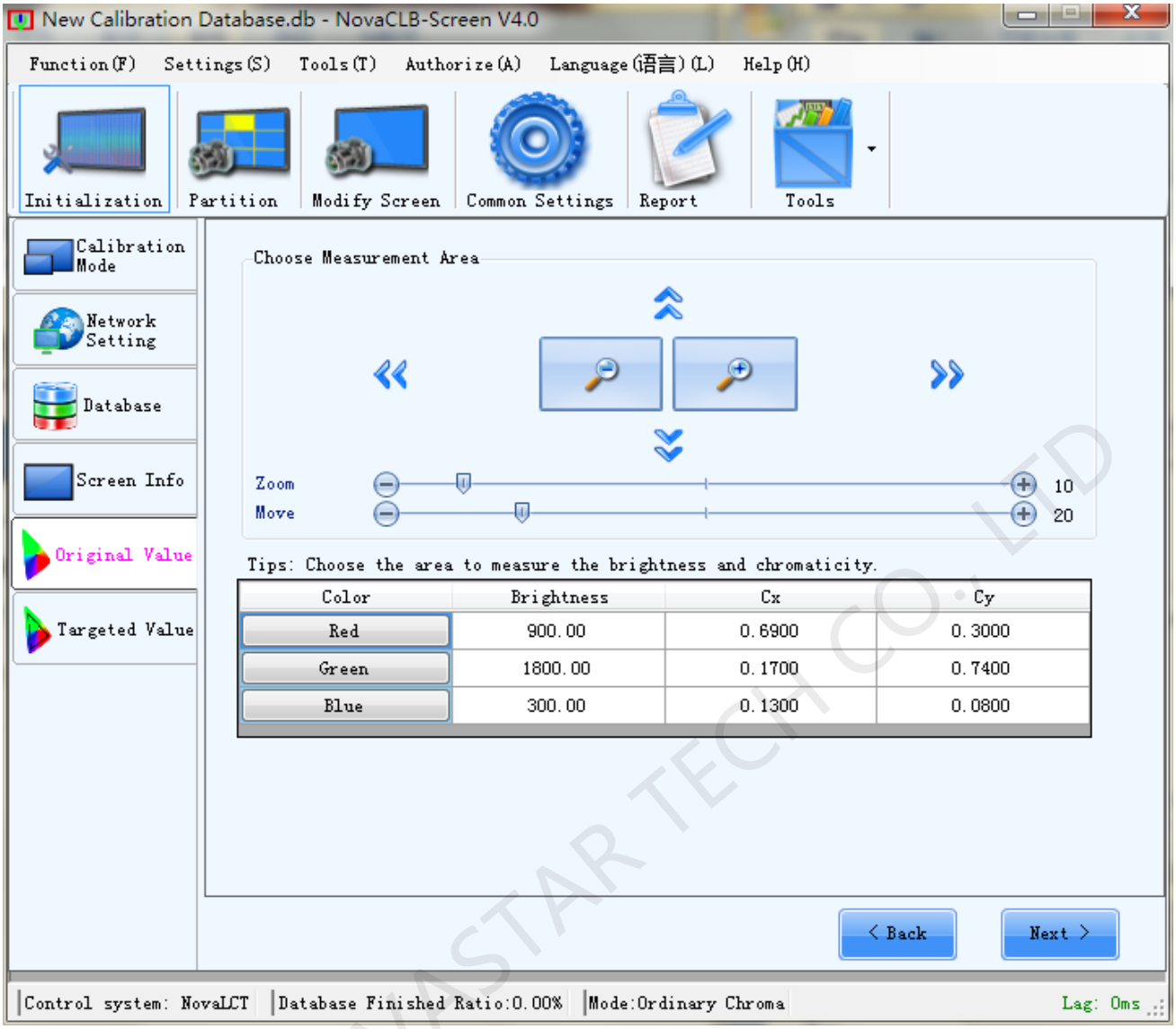


Fig. 3-14 Measure Brightness and Color of the Screen Combined by the Same Batch of Cabinets

Measuring Area Choosing

This measuring zone means the alight zone when measuring the brightness and color. It' s aiming at locating measuring zone problem when the screen is combined by different kind of cabinets. Users can change the size and location of measuring zone by click the four direction buttons and the middle button in the interface.

Brightness and Color Information

After Adjusting the measuring zone, users can click "Red", "Green", "Blue" buttons left to the table to control the display color. Then, users can measure brightness, Cx, and Cy to complete

measurement.

3) Screen is Combined by different Batches of Cabinets

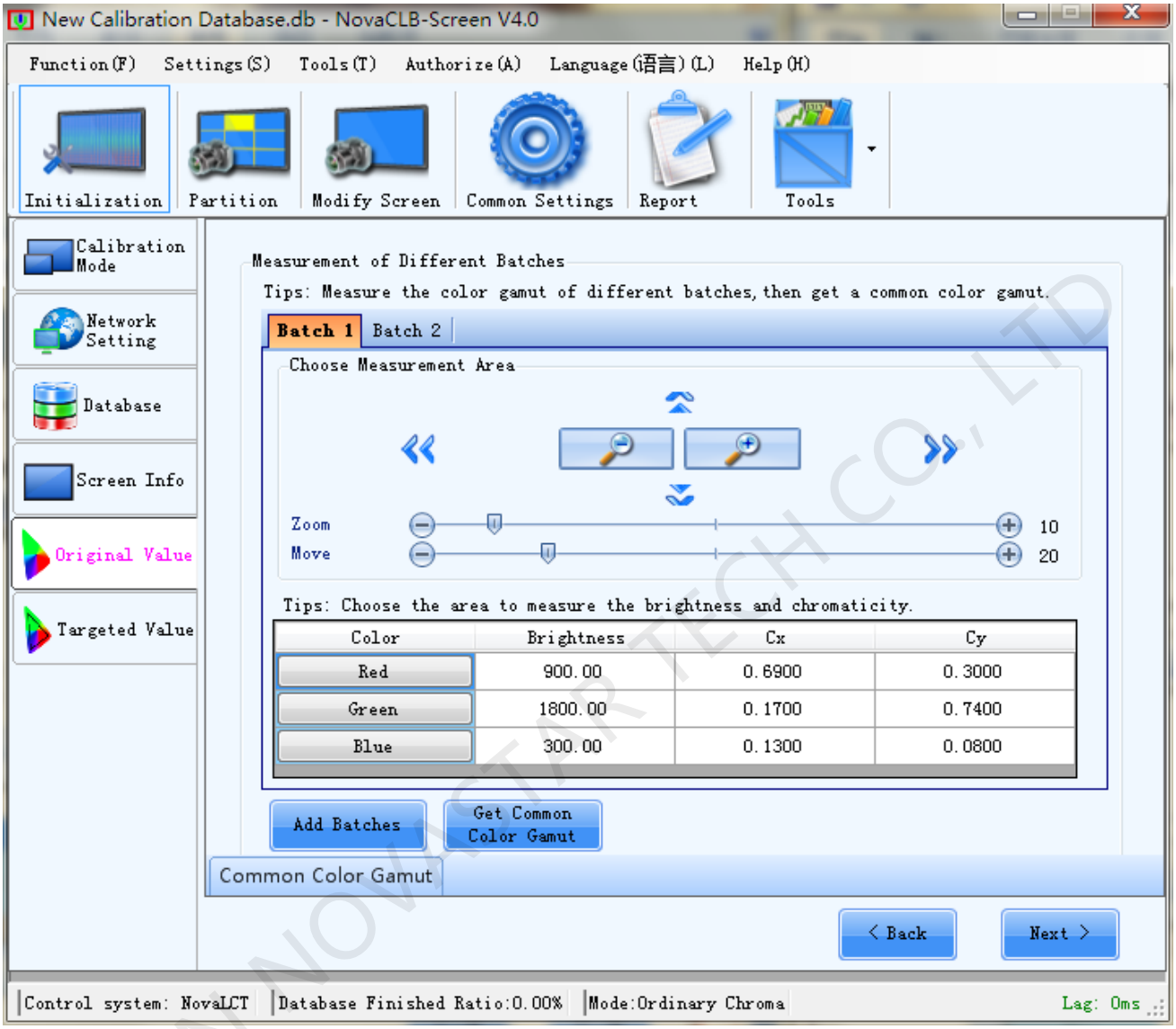


Fig. 3-15 Measure Brightness and Color of the Screen Combined by Different Batches of Cabinets

Measuring Zone Adjustment

It's same as the screen combined by the same batch of cabinets.

Batch Adding

In the software, the screen is combined by two batches cabinets by default, users can click "Add Batch" "button to add Batches.

Get Common Color Gamut

"Get Common Color Gamut" is the common part of measuring color gamut of different batches, is the key to achieve consistent uniformity. After complete measuring brightness and color of different batches of cabinets, users should click "Get Common Color Gamut" button.

Thus far, original brightness and color information of display is completed. Click "Next" to get into "Target Brightness and Color" settings.

3.2.6 Target Brightness and Color

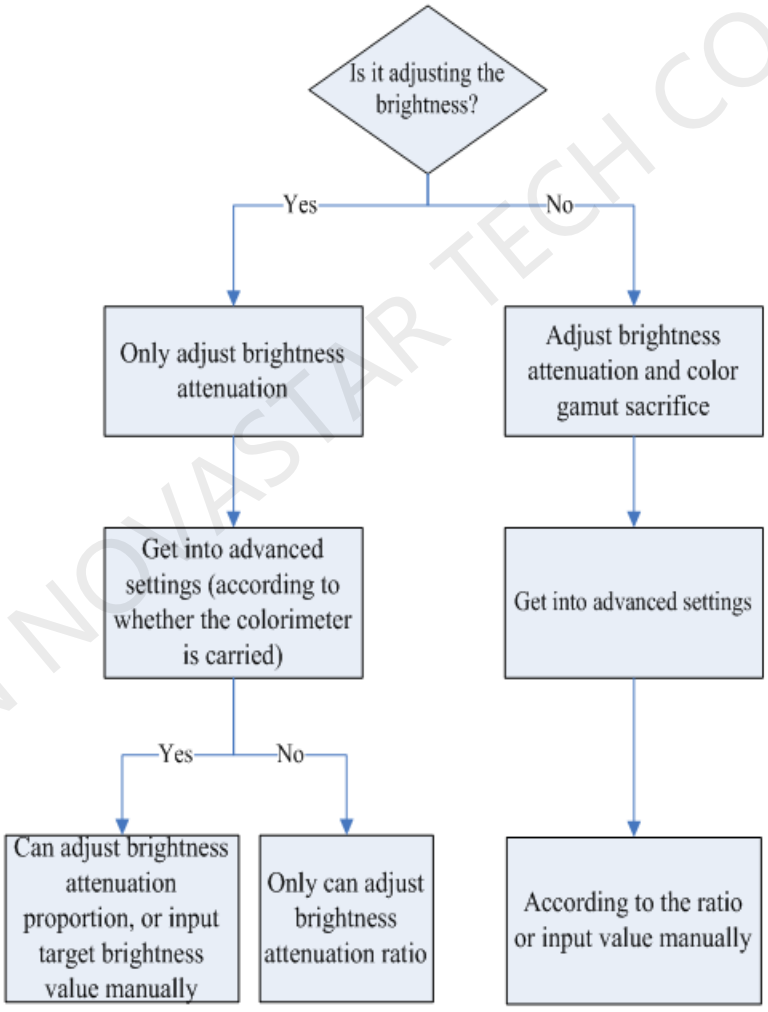


Fig. 3-16 Flow chart of Original Brightness and Color Settings

1) Calibration Mode Choosing

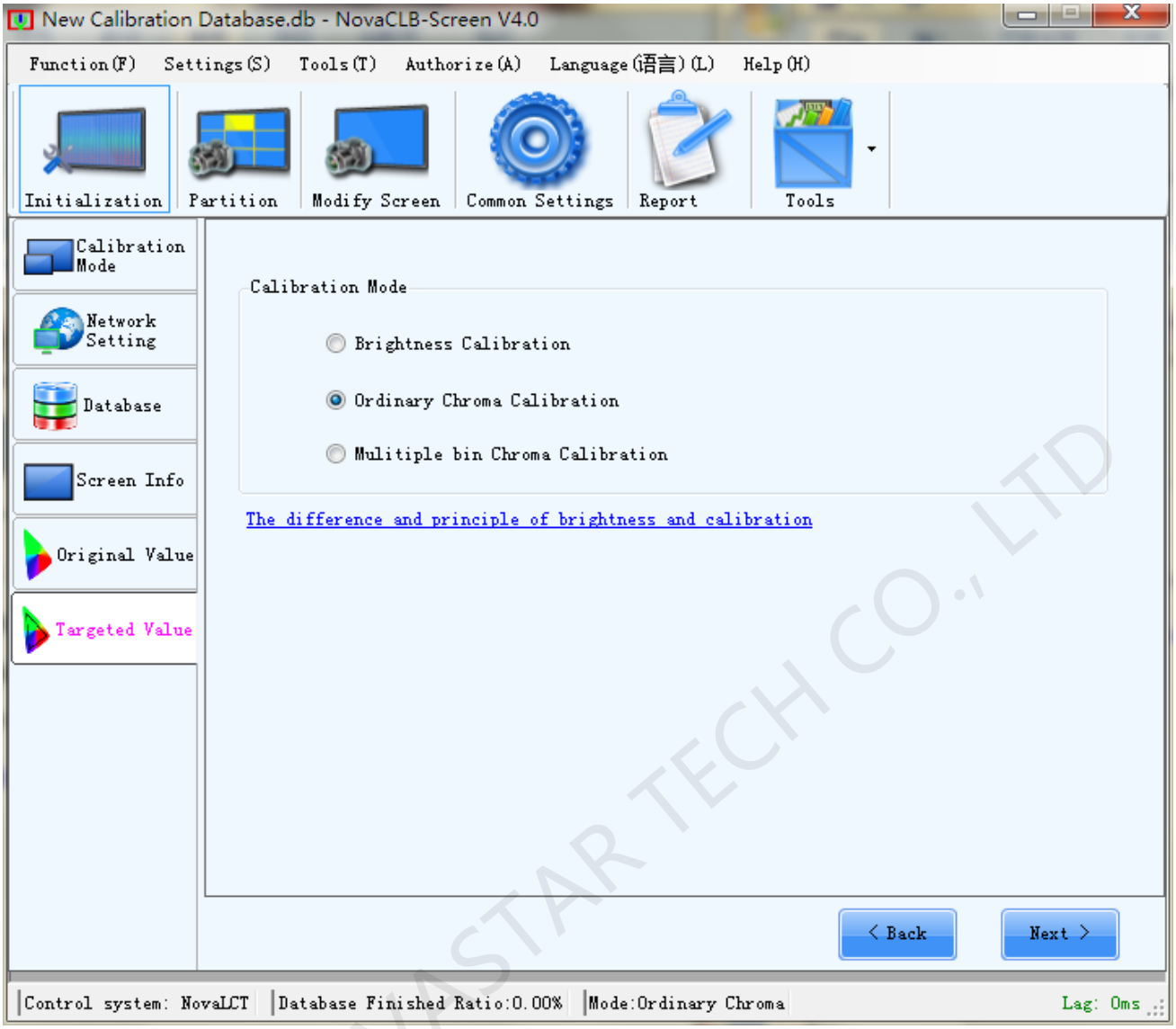


Fig.3-17 Calibration Mode Choosing Interface of Target Brightness and Color Settings

- Brightness Calibration

Brightness calibration can only change the brightness of R, G, B, and it will not attenuate the color gamut. But it can't eliminate the difference in color between LEDs.

- Ordinary Chroma Calibration

Brightness and Color calibration can change the brightness of R, G, B, and attenuate the color gamut. But it can uniform brightness and color between LEDs.

Users can click hyperlink "The difference of the Brightness and Color Calibration" in bottom left of interface for detail differences between these two calibrations.

➢ Multiple bin Chroma Calibration

Multiple bin chrome calibration is mainly used for adjusting the brightness difference after multi-batch of lamps or lamp panels have been mixed.

After choosing, click "Next" button.

2) Brightness Calibration

If users choose "brightness calibration", it will show as Fig.3-18.

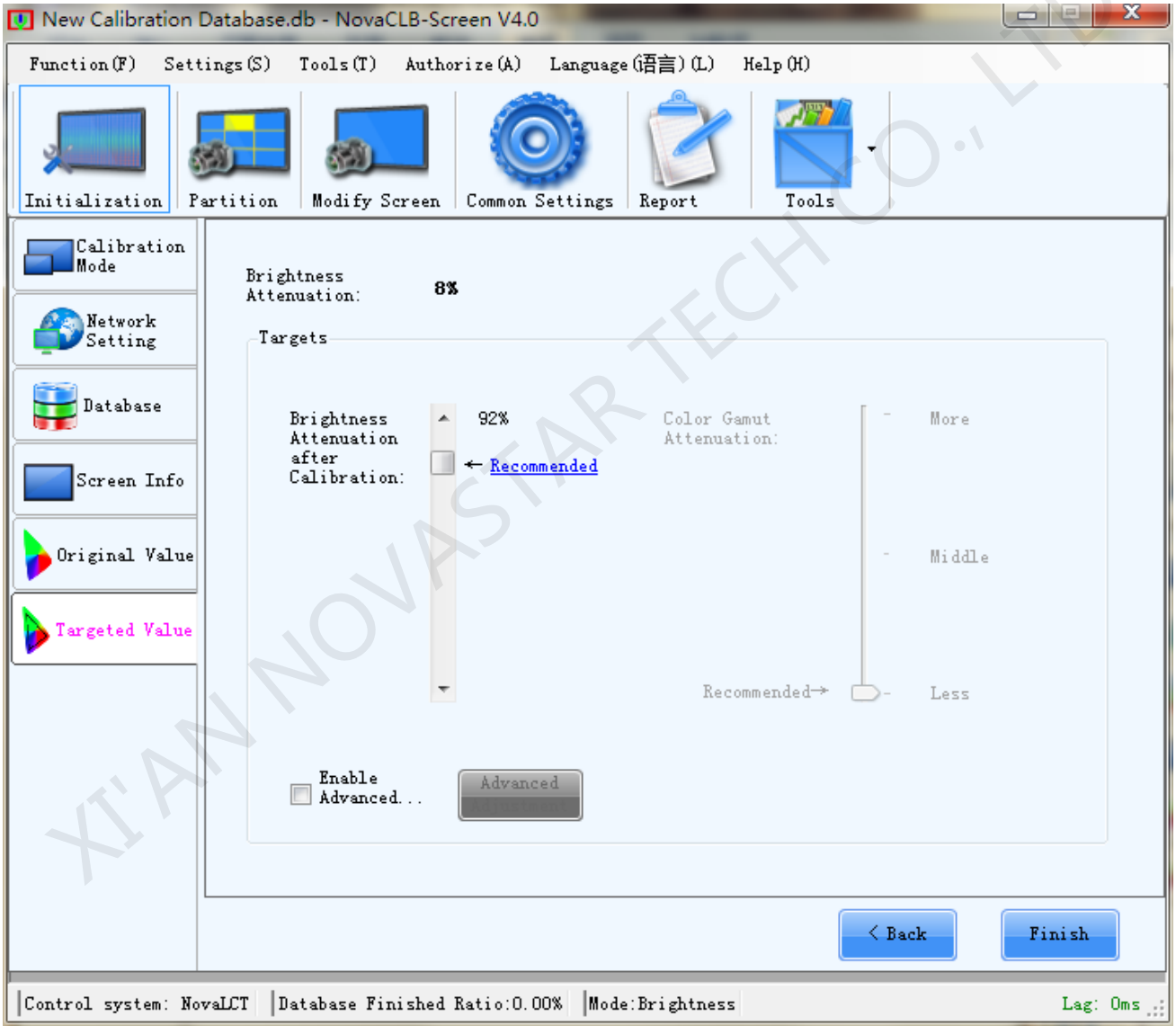


Fig.3-18 Brightness Calibration Interface of Target Brightness and Color Settings

Adjust vertical bar in the image above, choose an appropriate brightness attenuation value, the recommended value is 92%. This adjustment is the common attenuation of R, G, B. If the

separated adjustment is needed, check "Enable Advance" and click "Advanced Adjustment" button. Then, it gets into advanced settings interface Fig.3-19 and Fig.3-20.

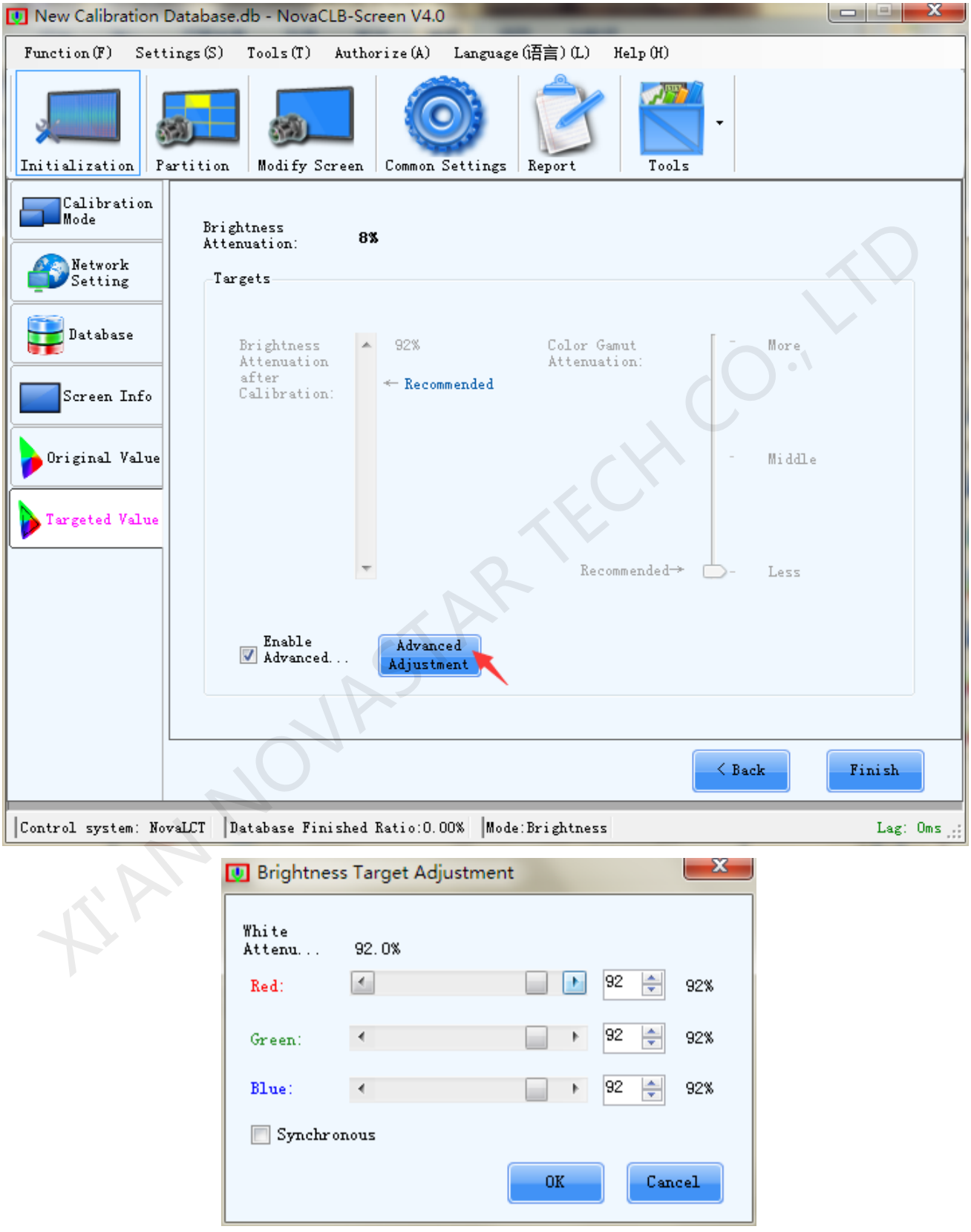


Fig.3-19 Brightness Attenuation Adjustment without Colorimeter

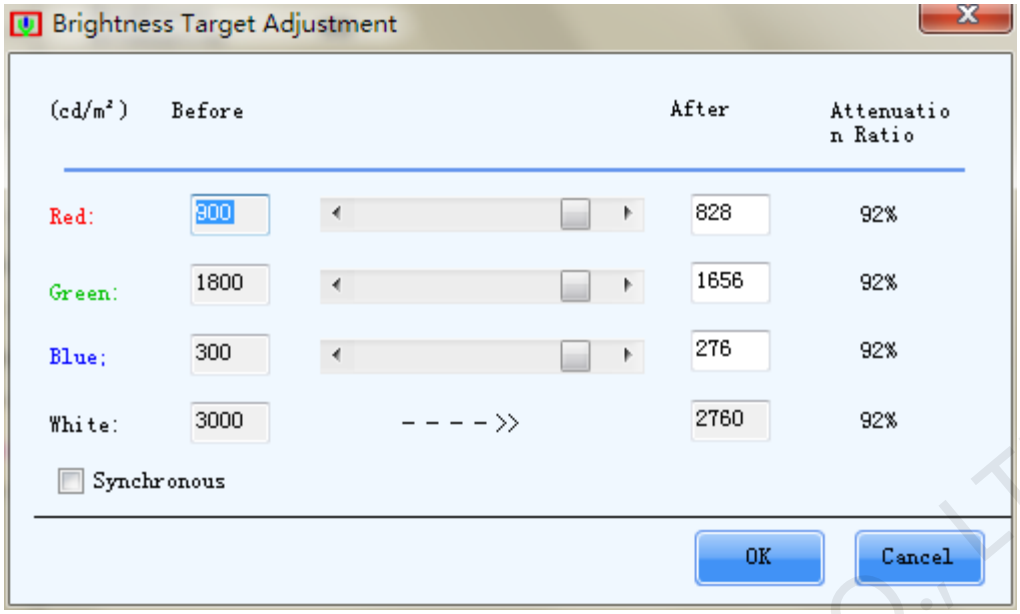


Fig.3-20 Brightness Attenuation Adjustment with Colorimeter

3) Brightness and Color Calibration

If users choose "Ordinary Chroma Calibration", it will show as Fig.3-21.

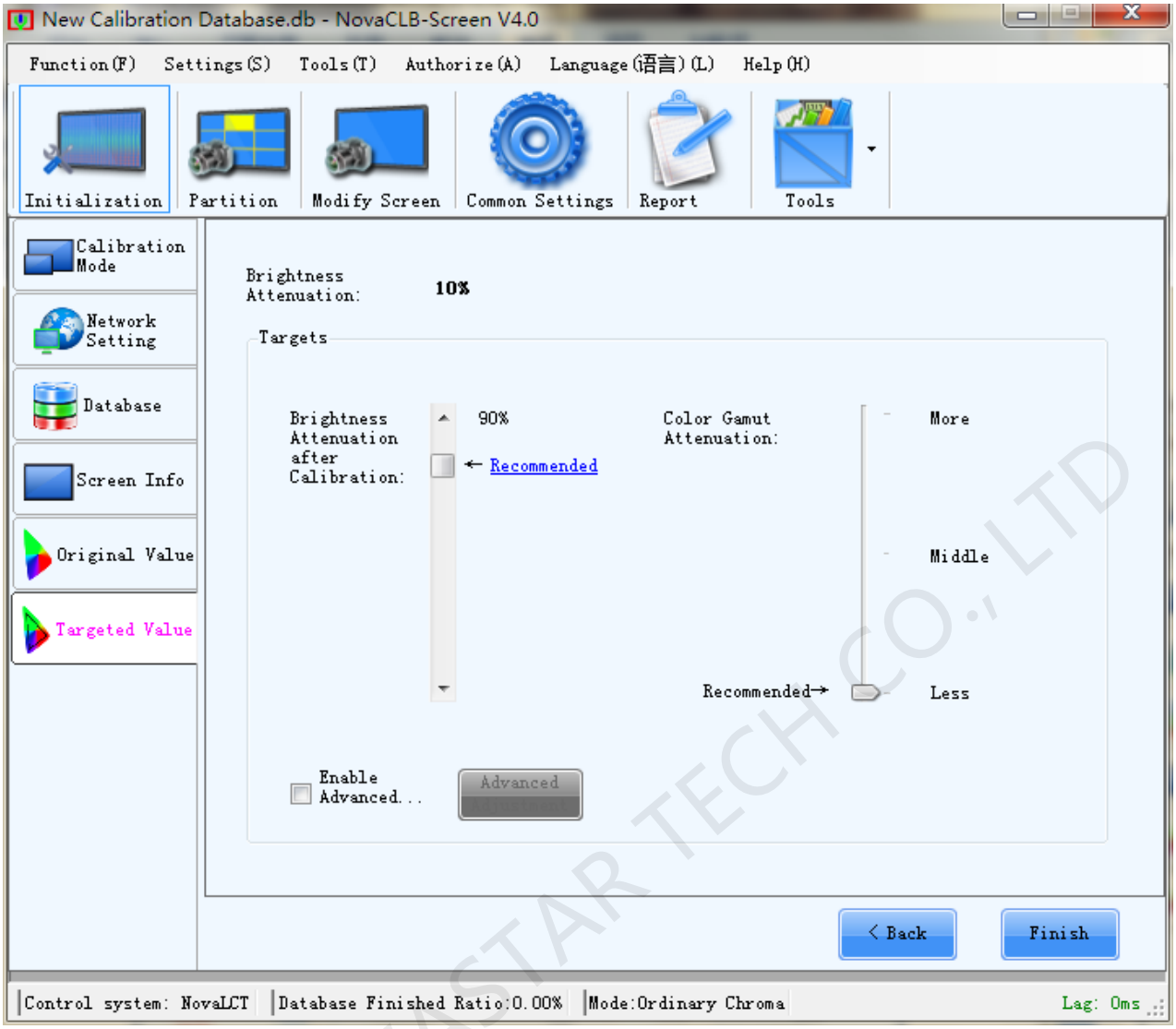
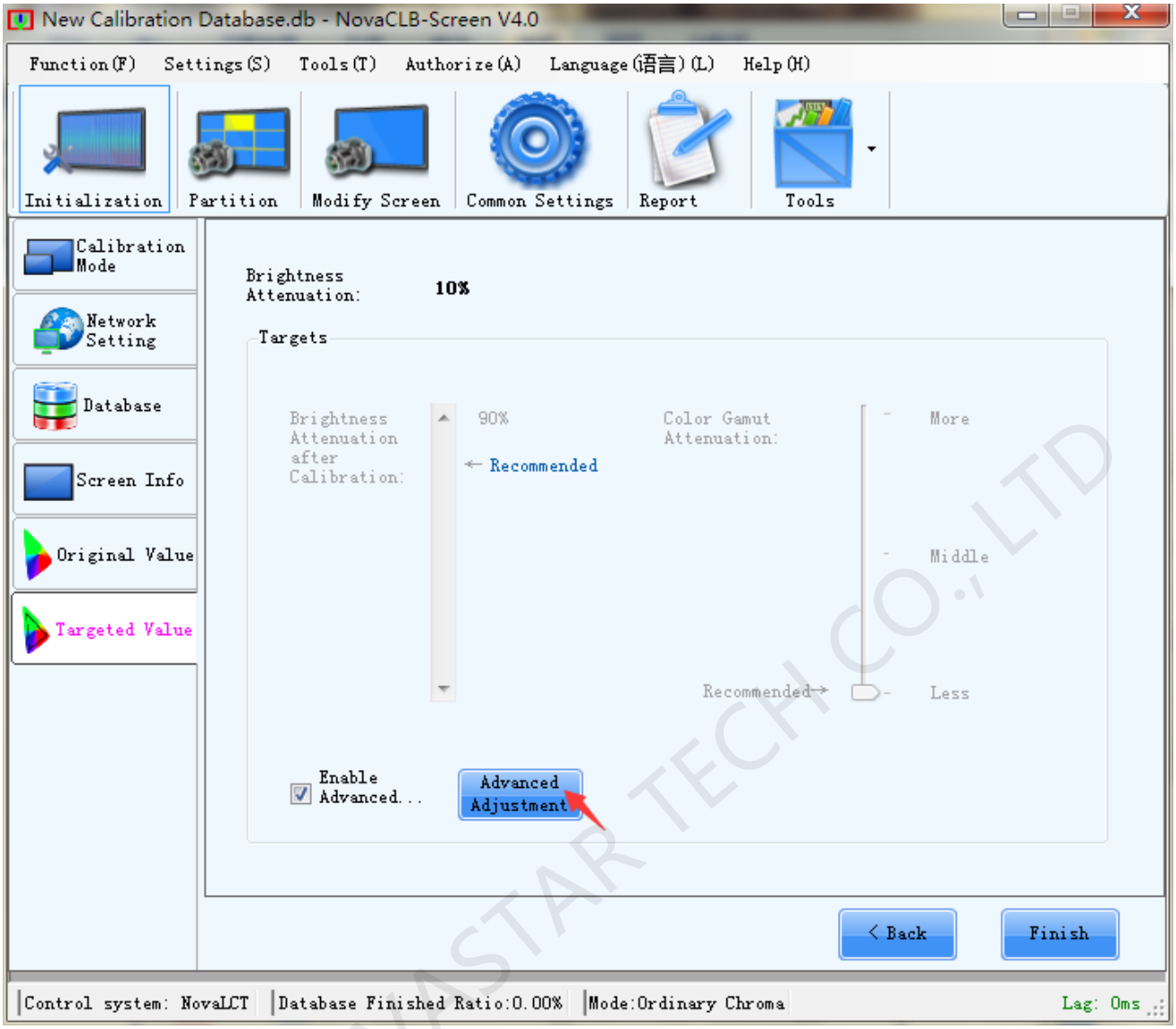


Fig.3-21 Ordinary Chroma Calibration Interface of Target Brightness and Color Settings

Adjust vertical bar in the image above to simply adjust the brightness and color, the recommended value is 90%. The color gamut attenuation can be divided into three grades: Low, Middle, High, the "Low" is recommended. But if the uniform of display is very bad or users want a high uniform, "Middle" or "High" can be chosen. If detailed settings are needed, users could get into advanced interface as Fig.3-22.



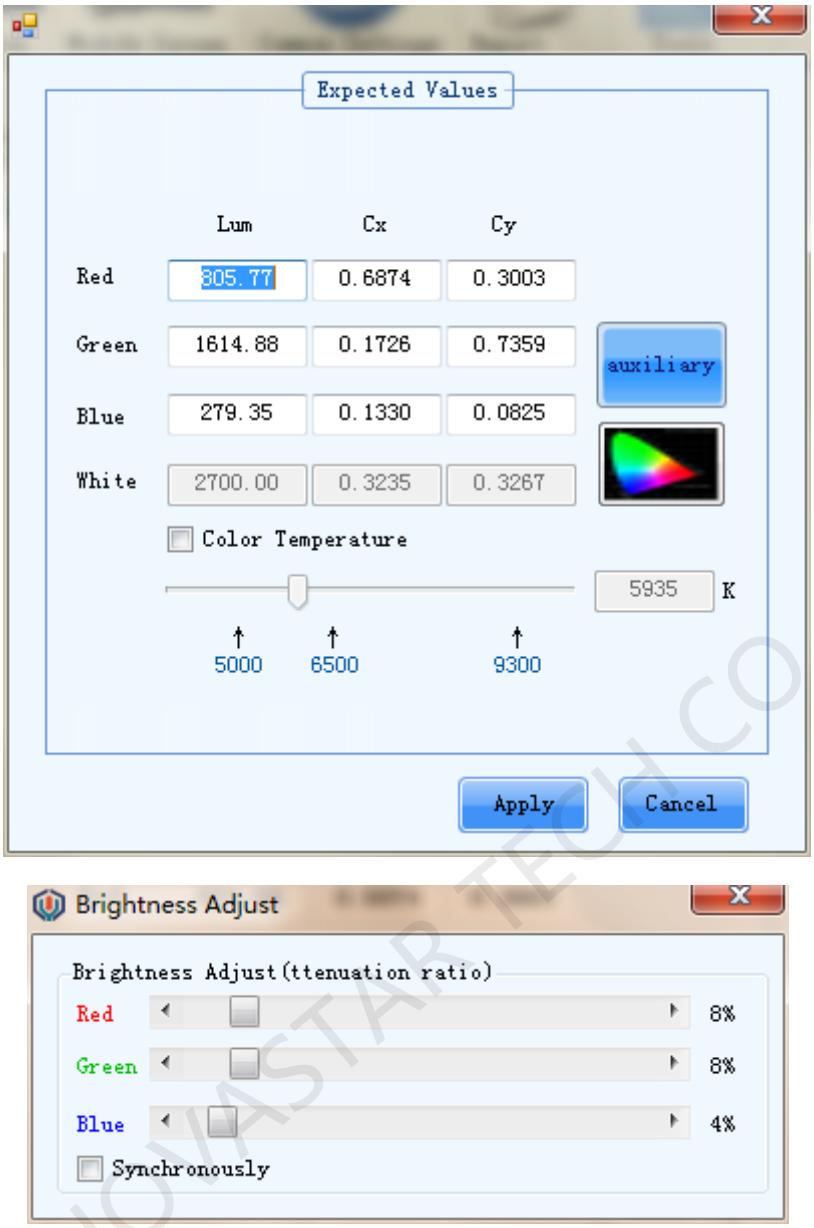


Fig.3-22 Advanced Settings Interface of Ordinary Chroma Calibration

In the image above, users can adjust target brightness and color value by the auxiliary on the right, also users can input values in the textbox directly. Recommend using the first method

After adjustment, click button to look up the current brightness and color value in CIE 1931 Color Diagram.

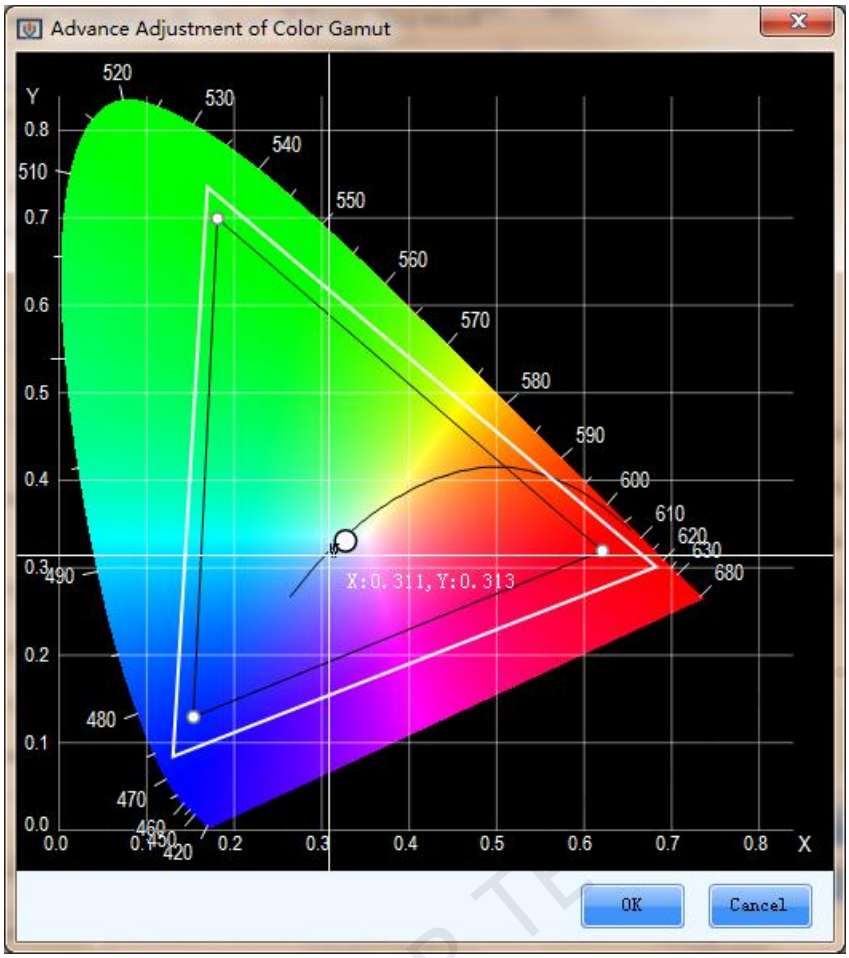


Fig.3-23 Measuring and Target Color Gamut in CIE 1931 Color Diagram

✧ Original Color Gamut

It is corresponding to "Original Brightness and Color" in software.

✧ Targeted Color Gamut

It is corresponding to "Target Brightness and Color" in software.

The white triangle in the image is corresponding to measuring color gamut, the black triangle is corresponding to target color gamut. To realize the uniformity after calibration, the target color gamut should less than measuring color gamut. From the image above, users can get the attenuation of color gamut. Users can also click the right mouse button in Color Diagram to choose adding the color coordinate to "Target Brightness and Color" value.

The former method is recommended.

Users can also check "Color Temperature" and directly enter an appropriate color temperature value , or drag the bar to set color temperature value, or click to use the recommended color temperature value, where three commonly used color temperature values are provided: 5000K, 6500K, 9300K.

Note: The prerequisite for using this method is that the original red, green and blue brightness and chromaticity values (for example, brightness and chromaticity values shown in Fig. 3-14 and Fig. 3-15) must be accurate values measured by the light gun.

Fig.3-24 Expected Color Temperature

4) The operation step of **multiple bin Chroma Calibration** is basically the same as "Ordinary Chroma Calibration" pattern.

3.3 Partition calibration

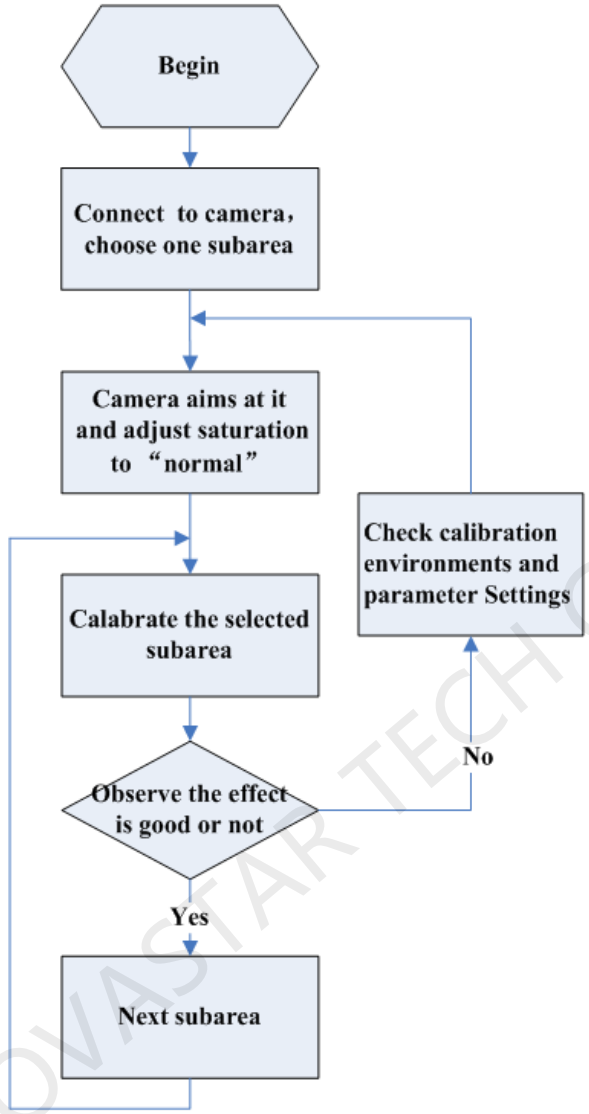


Fig. 3-25 Partition calibration Flow Diagram

Partition calibration is the process of realizing screen calibration when calibration parameter settings are finished.

3.3.1 Partitions

"Partitions" here is regarded as a verb-divide. Consider the constraint of the size of camera lens, the screen need to divide into several proper subareas to calibrate.

3.3.1.1 Normal Partition

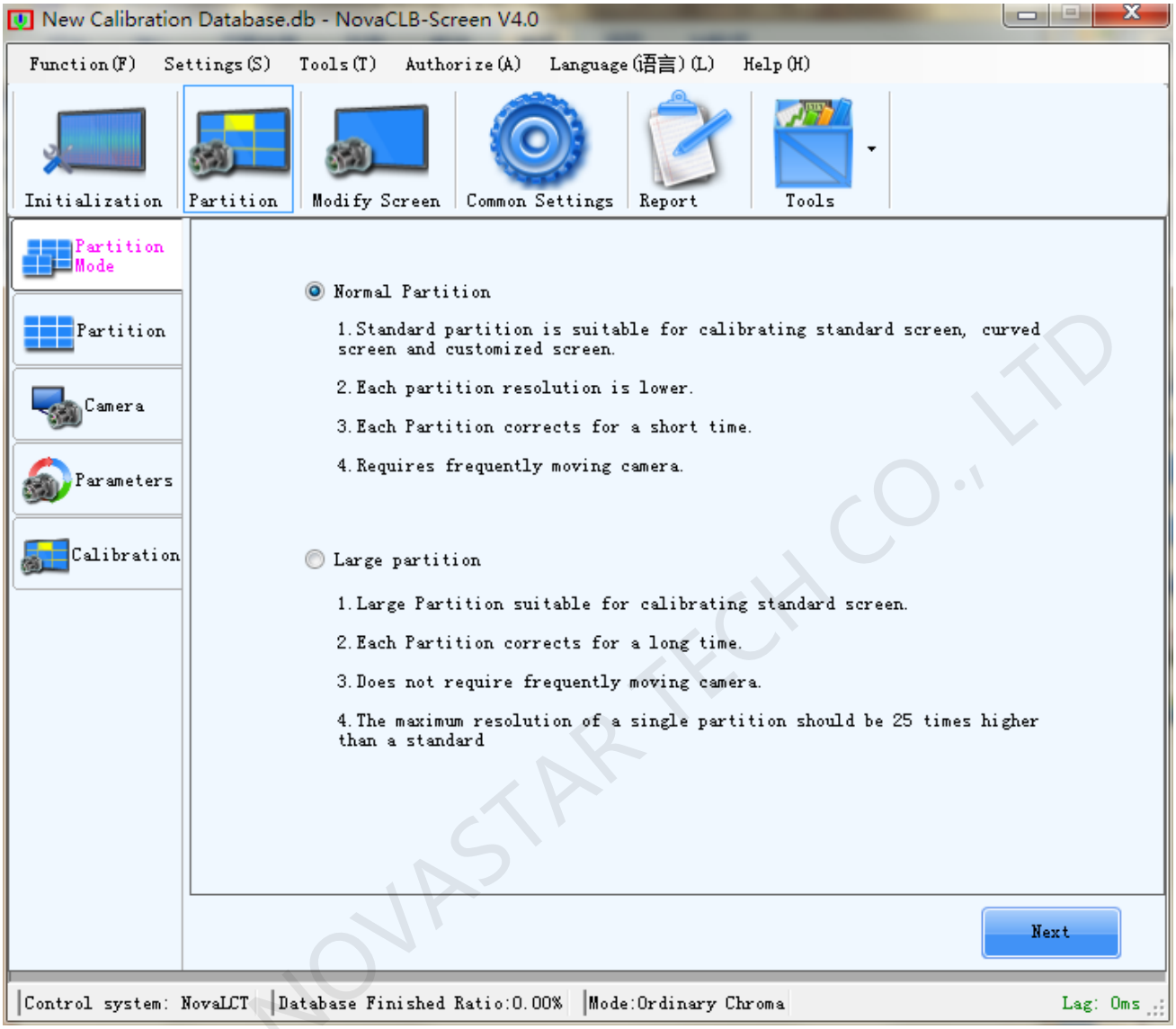


Fig. 3-26 Page Of Partitions

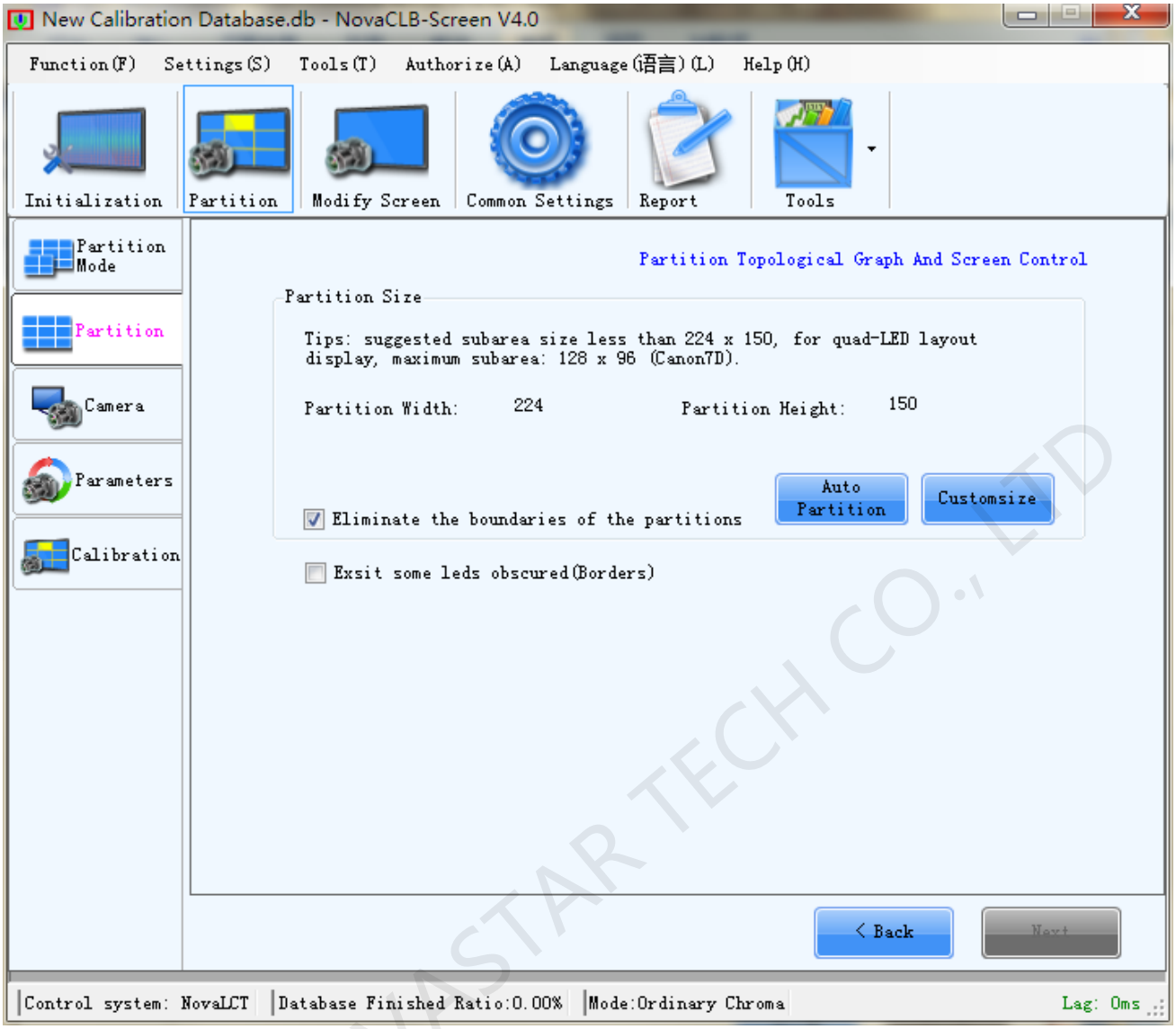
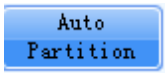


Fig. 3-27 Parameter Setting of Normal partitions

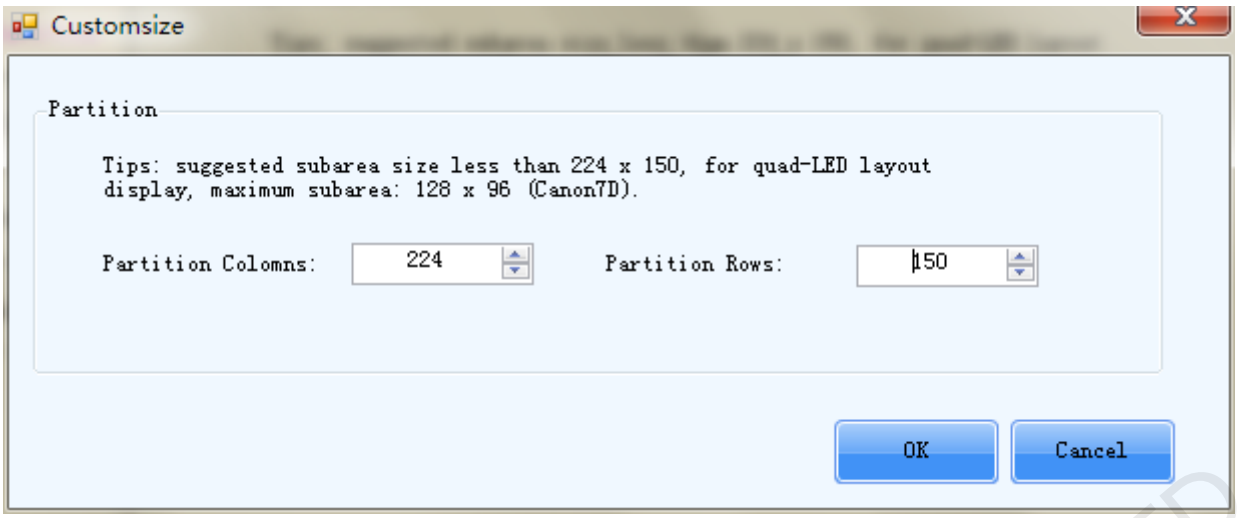
Due to the limitation of the camera's resolution, the screen needs to be divided into several proper subareas to be calibrated.

Recommend users to adopt intelligent partition. Click 

, thus the software will automatically divide the display into serveral partitions of reasonable size;

click 

to adopt customized partition.Single subarea rows and columns settings may refer to the top of the recommended partition size, generally speaking, 224 x 150 is more appropriate.



When finished, click "Create Partition", then you can see the result as shown in fig 3-28.

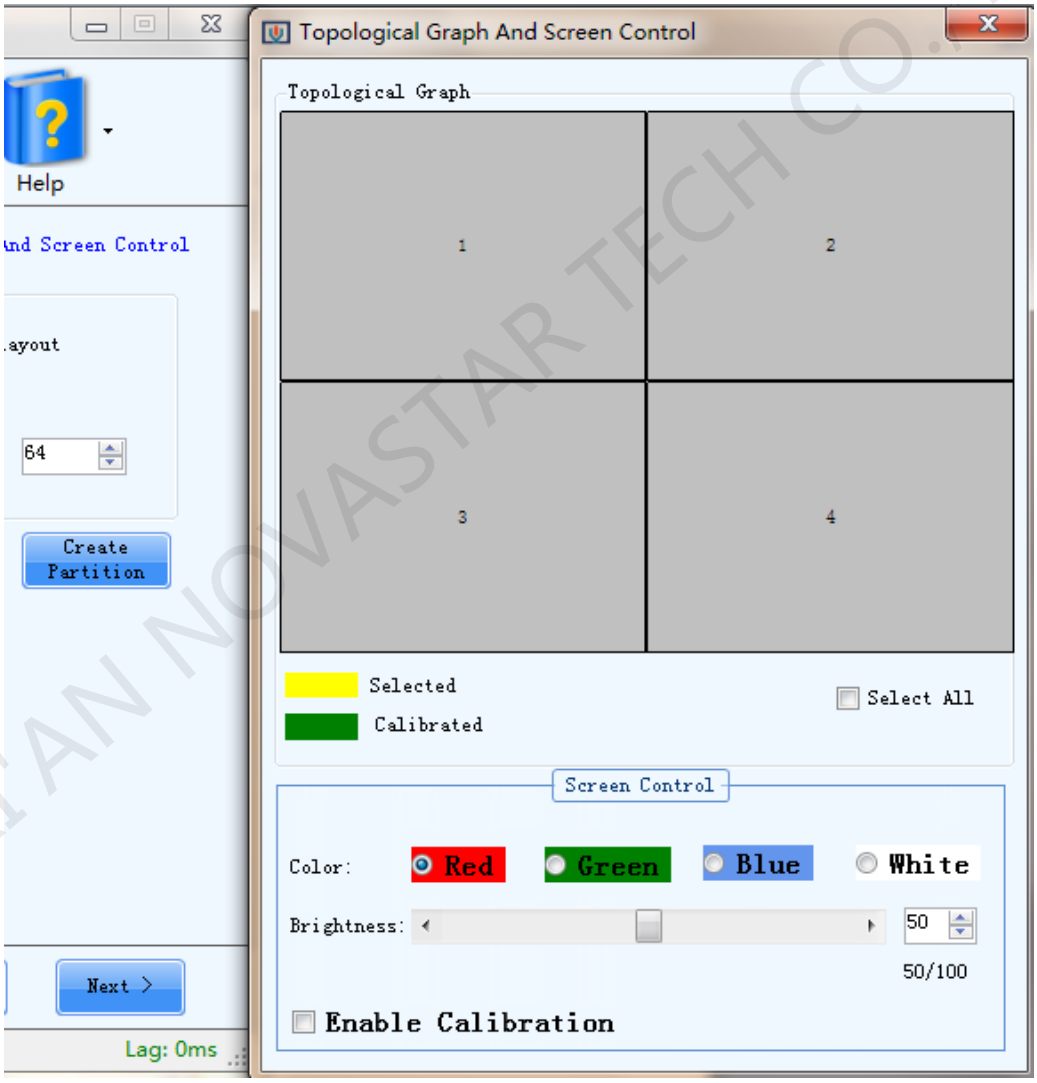


Fig. 3-28 Topography Graph And Screen Control Window

Topography Graph

It is composed of divided subareas, and number these subareas from left to right, from top to

bottom.

Screen Control

It is used to realize the control of screen color, brightness and division switch.

The right window can move together with the main window, and can shut down when unnecessary. Click "Partition Topological Graph And Screen Control" on the right page, it will popup.

It is advised to check “Eliminate the boundaries of the Partitions” to eliminate differences among partitions.

If there is binding around the display, it is necessary to check “Exsit some leds obscured” and input the columns and rows of borders and then click  to view the screen. The operation is successful when see the fist rows or columns have on it .

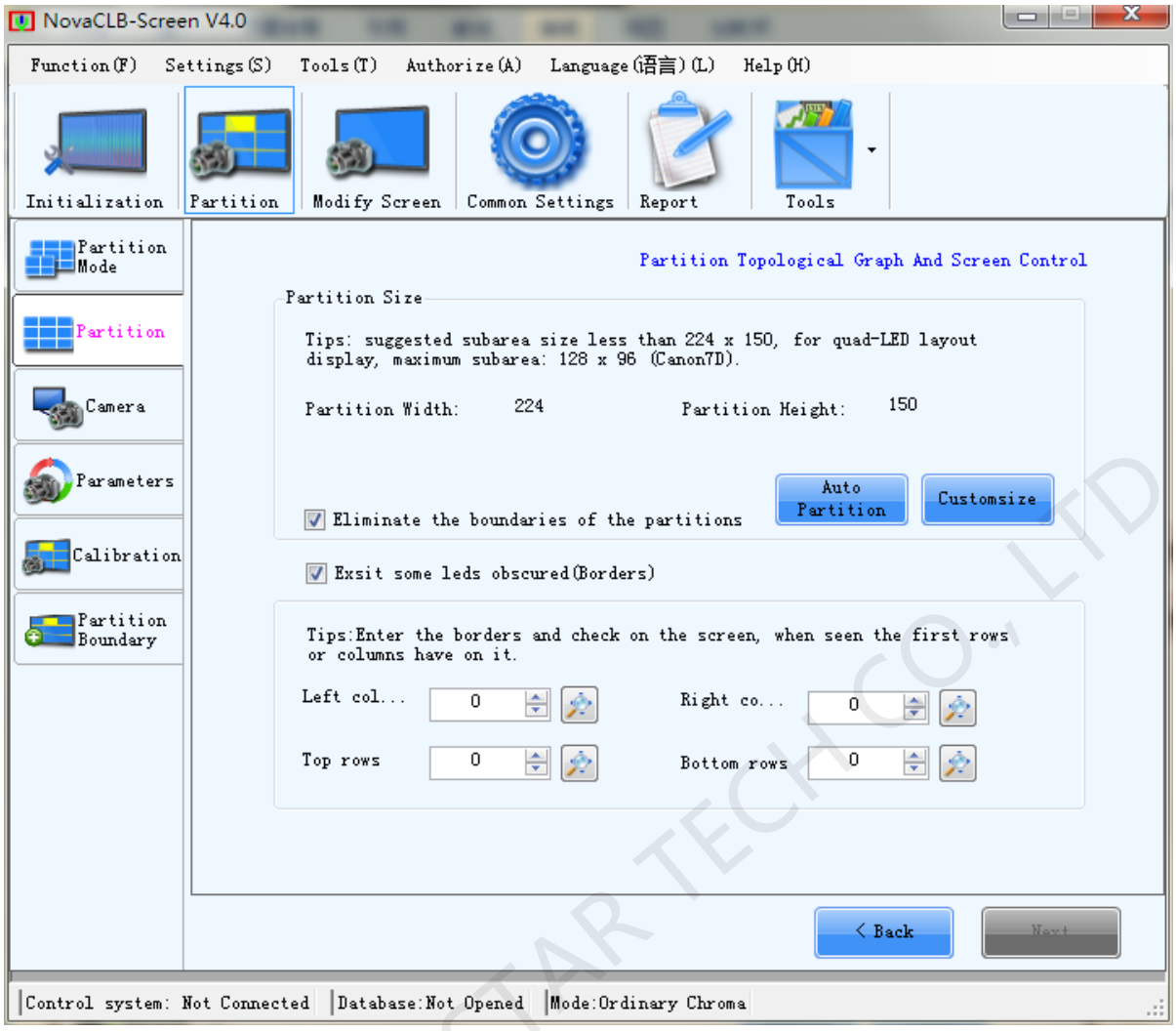


Fig. 3-29 Setting the number of rows and columns of borders

After division, click "Next", enter into "Connect to camera".

3.3.1.2 Large partition

Compared to normal partition, large partition features that the correction area is several times larger than normal partition. For example, if the unit number is set as 5×5, the maximum correction area is 224×5,150×5 when the camera adopts large partition. The current supporting number of element is 10×10 in maximum; the correctable area is 2240×1500 in maximum.

If large partition calibration is adopted, full-screen calibration is no longer necessary.

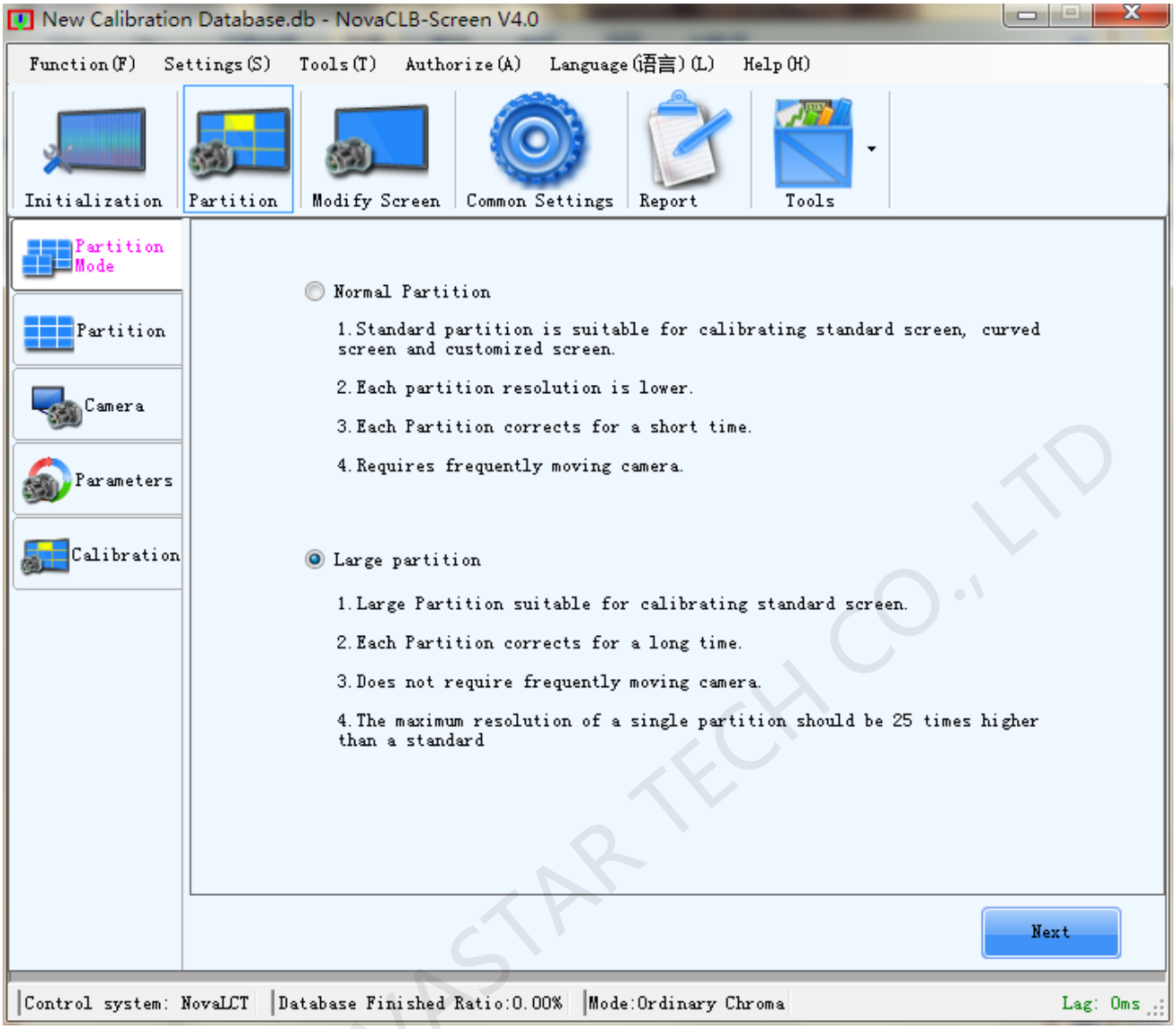


Fig. 3-30 Large partition

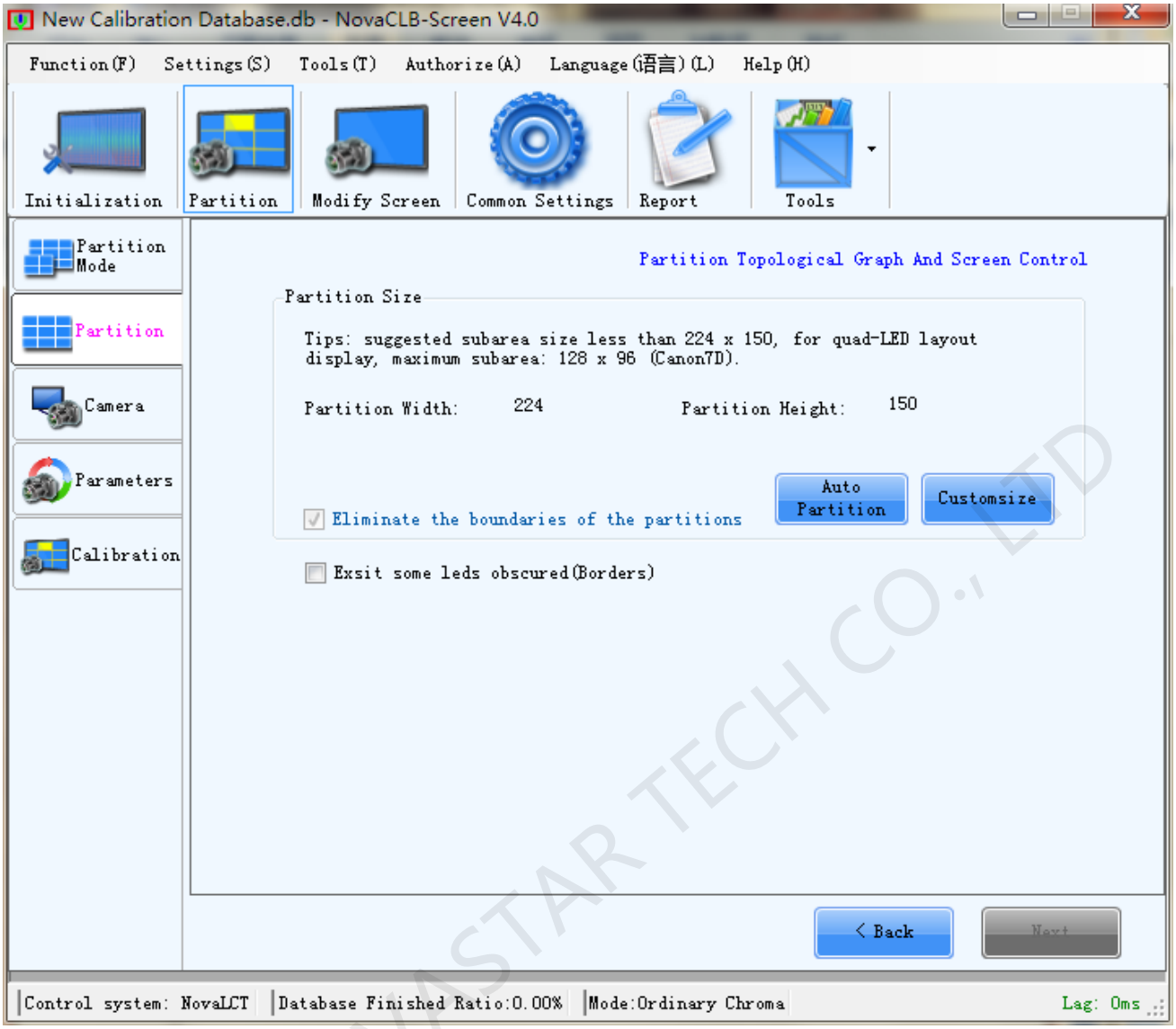
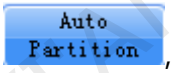


Fig. 3-31 Parameter Setting of Large Partition Calibration

Click 

, thus the software will calibrate the proper pixel size of a single partition according to the display size and conduct auto-partition.

Click 

to set the unit size when adopting customized partition.where columns and rows collected by the camera cannot exceed the default value "224×150", and the partition size (unit columns and rows ×columns and rows collected by the camera) is displayed at the bottom of the interface. After setting is finished, click 

.

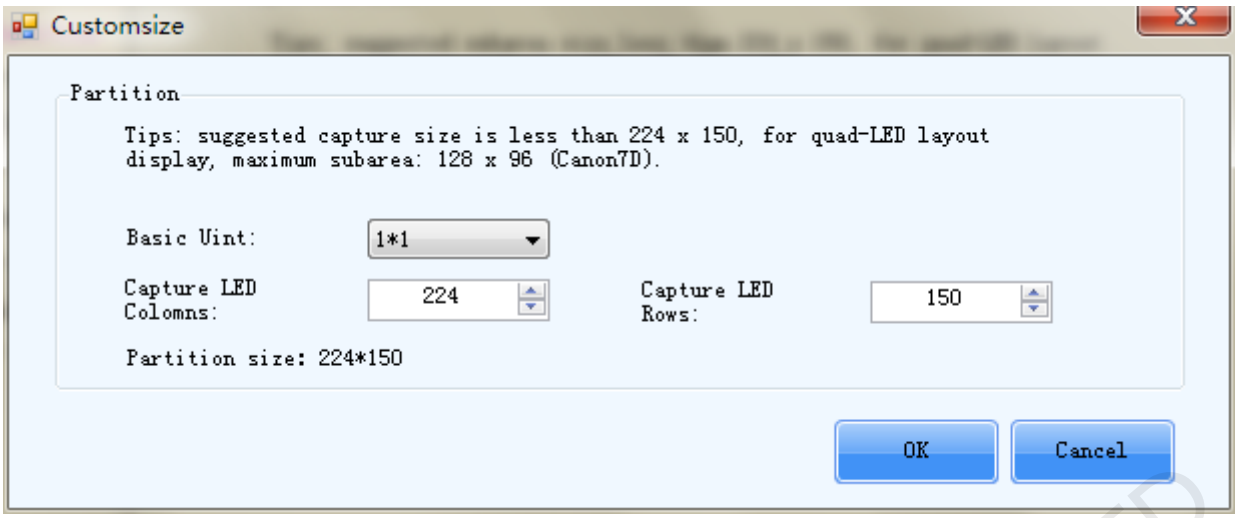


Fig. 3-32 Custom size

If there is binding around the display, it is necessary to check "Exsit some leds obscured" and input the pixels of columns and rows of borders and then click to view the screen. The operation is successful when see the fist rows or columns have on it .

3.3.2 Connect To Camera

When succeed in connecting to camera, the interface appears as fig 3-33 show. You can click help documents on the left to obtain some camera operating skills and partition imaging techniques.

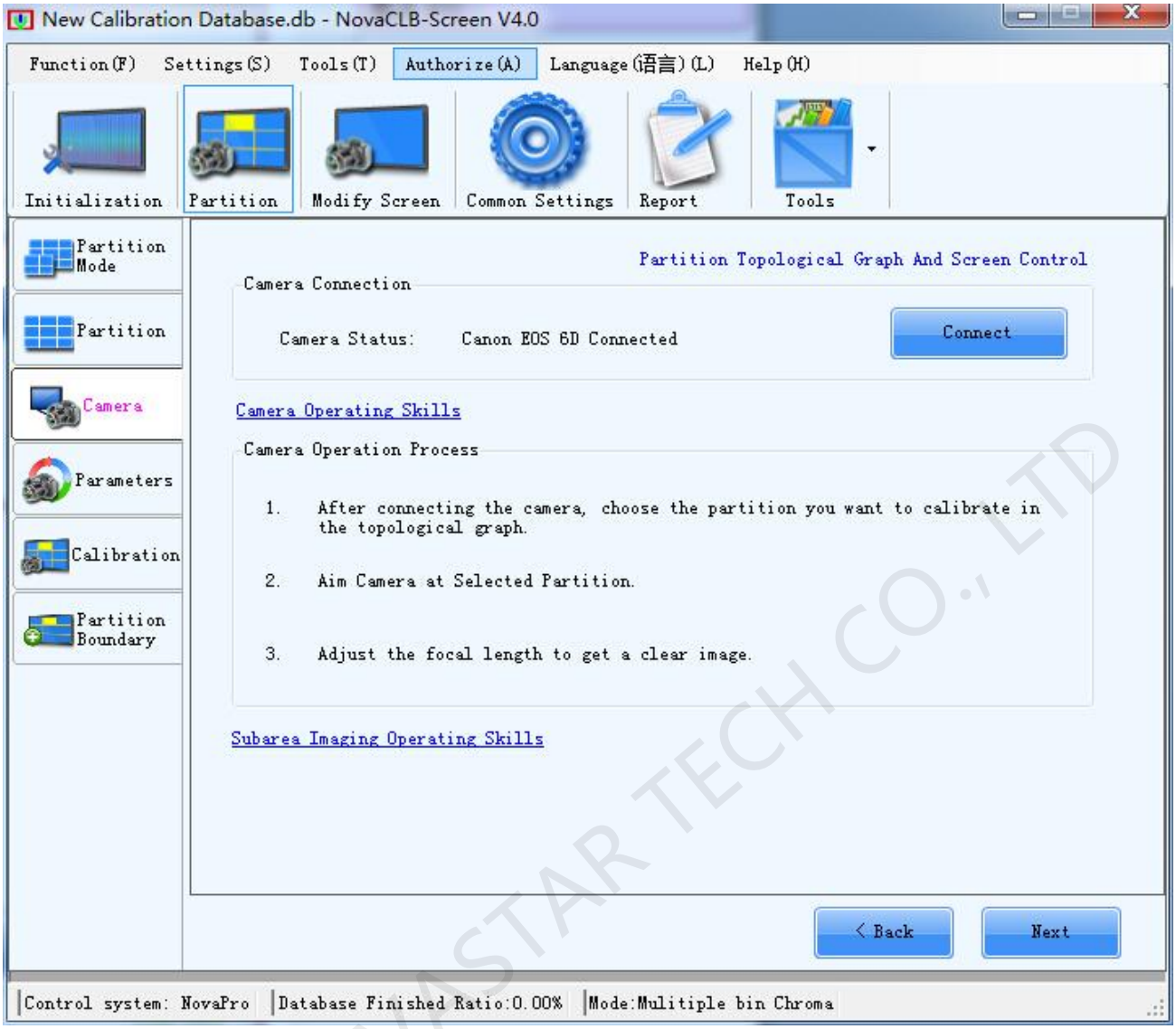


Fig. 3-33 Connect To Camera

3.3.3 Camera Parameters

No matter manual mode or automatic mode is adopted, adjust the saturation till the result reaches "**Normal**", and adjust the image size to "**Proper**" , and during this process, make sure that the camera faces to the partition.

Notice: If the image area is relatively small when the saturation is normal, the micro focus ring can be adjusted to blur the image, After zooming the camera window. the image seen in camera window is different from the actual image. The user can solve the problem by clicking the LED light spot in the image prompted by magnifying glass to separate them.

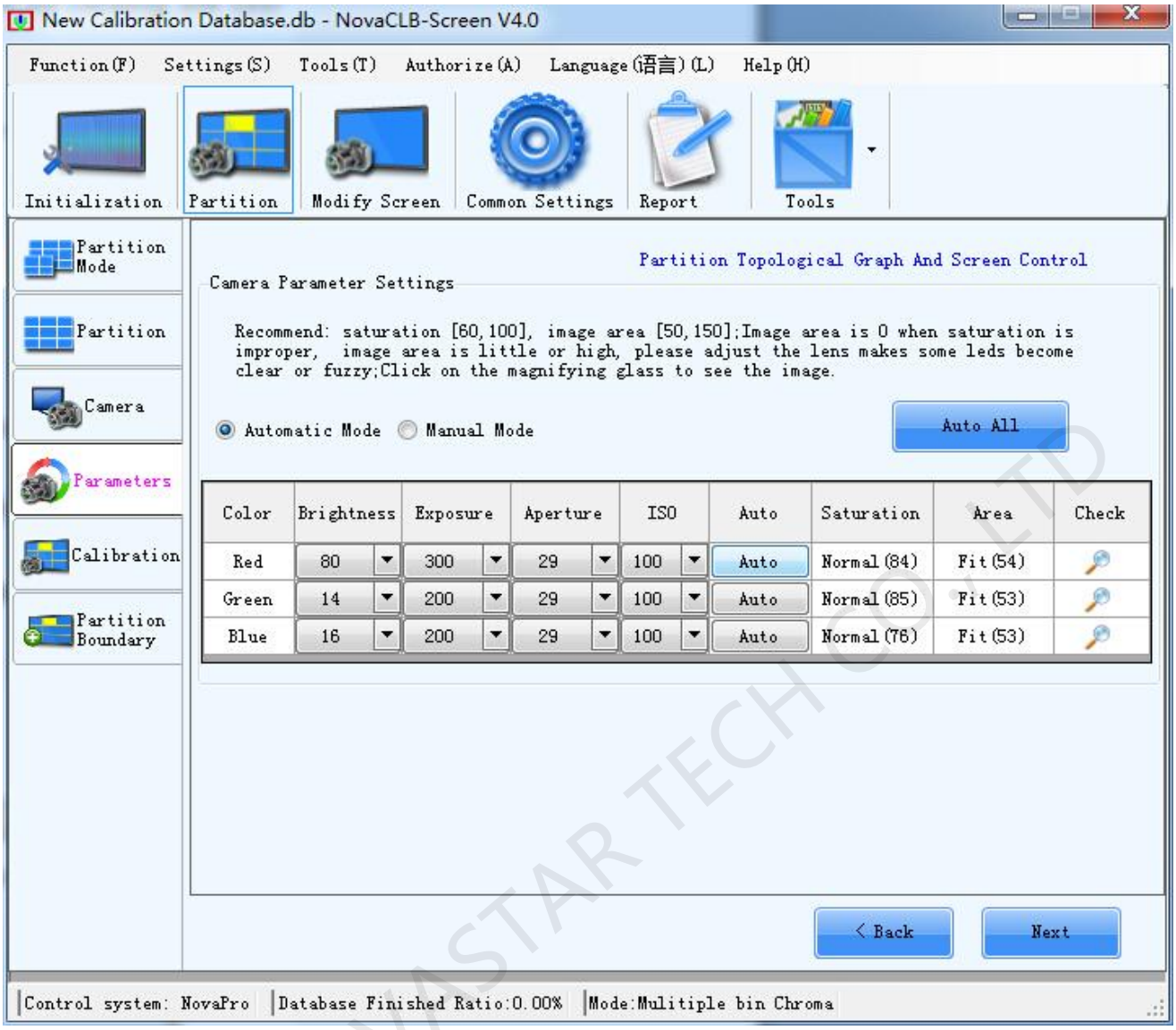


Fig. 3-34 Camera Parameters

✧ **Automatic Mode**

This mode is the default mode. Under this mode, users just need to click on "Auto All" button, then the software will automatically analysis and adjust the saturation, finally achieve "normal". If failed, please check the calibration environment and parameters, then try again.

The below dialog would be shown when clicking ‘Auto’ or ‘Auto All’ button. Please go to LCT offline calibration interface according to the tips.

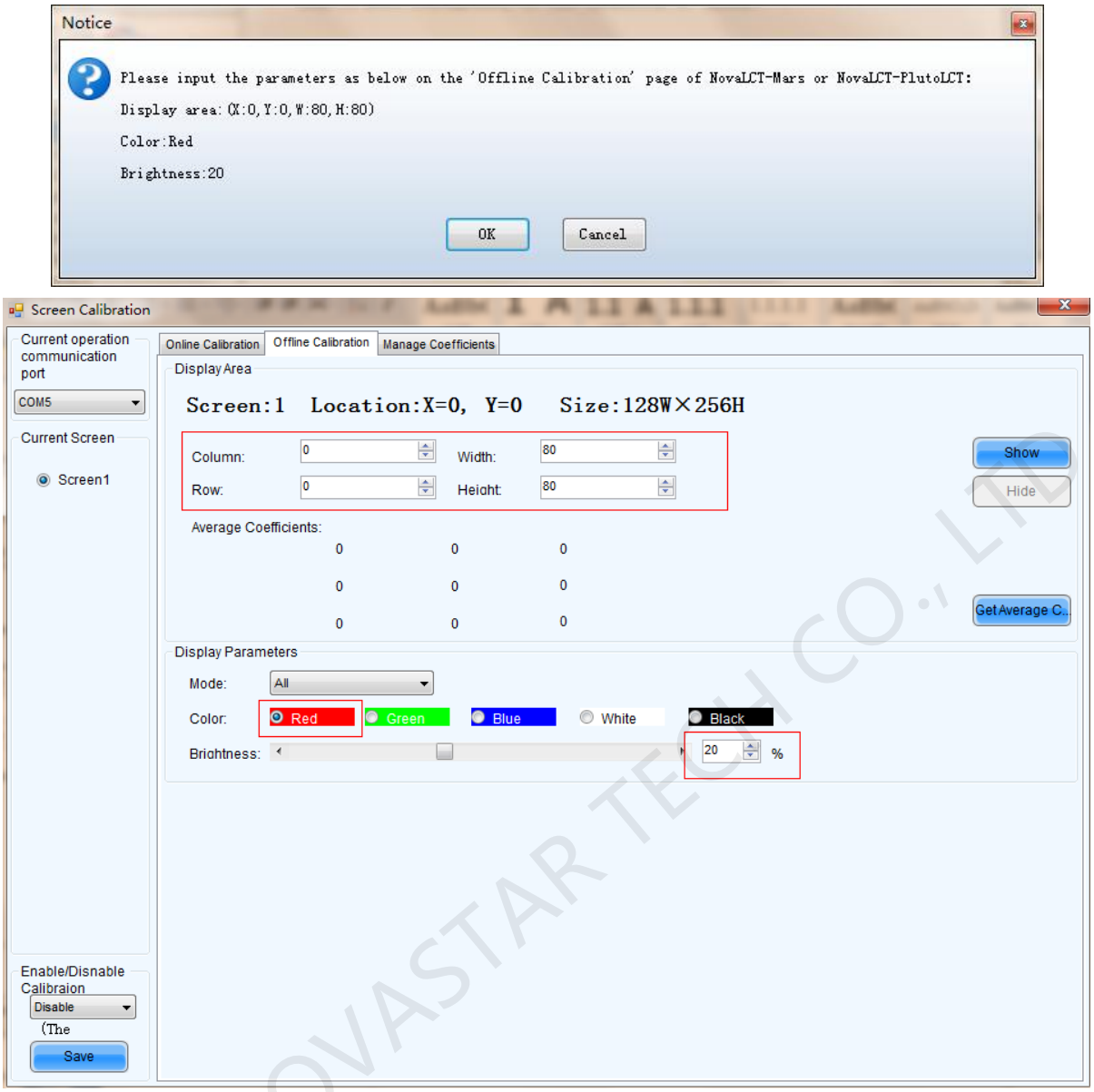


Fig. 3-35 Set display parameters

Manual Mode

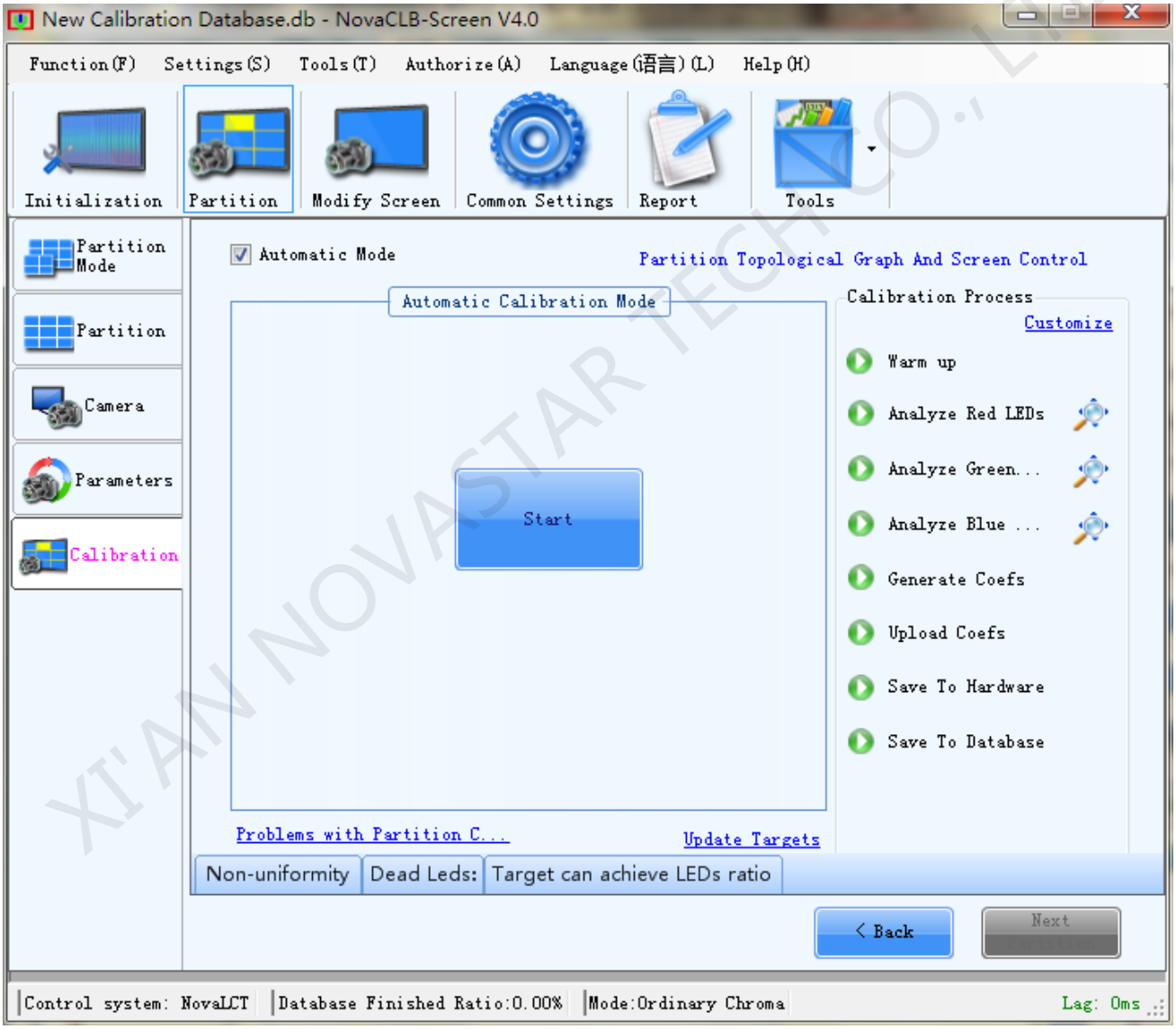
Under this mode, users should adjust calibrate brightness, exposure time and aperture size. When adjusting, give priority to "aperture", followed by "exposure", and finally "brightness".

Attention: The default brightness under large partition mode is 50, and the routine partition is 30. Automatic analysis is advisable. Manual adjustment can be carried out if experienced. Next step can be taken only if the analysis result is normal. Saturation between 60 and 100 is normal，it is proper to adjust the image size to 50~150.

You can click  to view the image obtained after saturation adjustment, in order to help find problems. When red, green, blue analyses are all completed, click "next" to enter into the page "Partition calibration".

3.3.4 Partition Calibration

No matter manual mode or automatic mode is adopted, make sure the adjusting result of the saturation to be normal, and during this process, make sure that the camera faces to the partition.



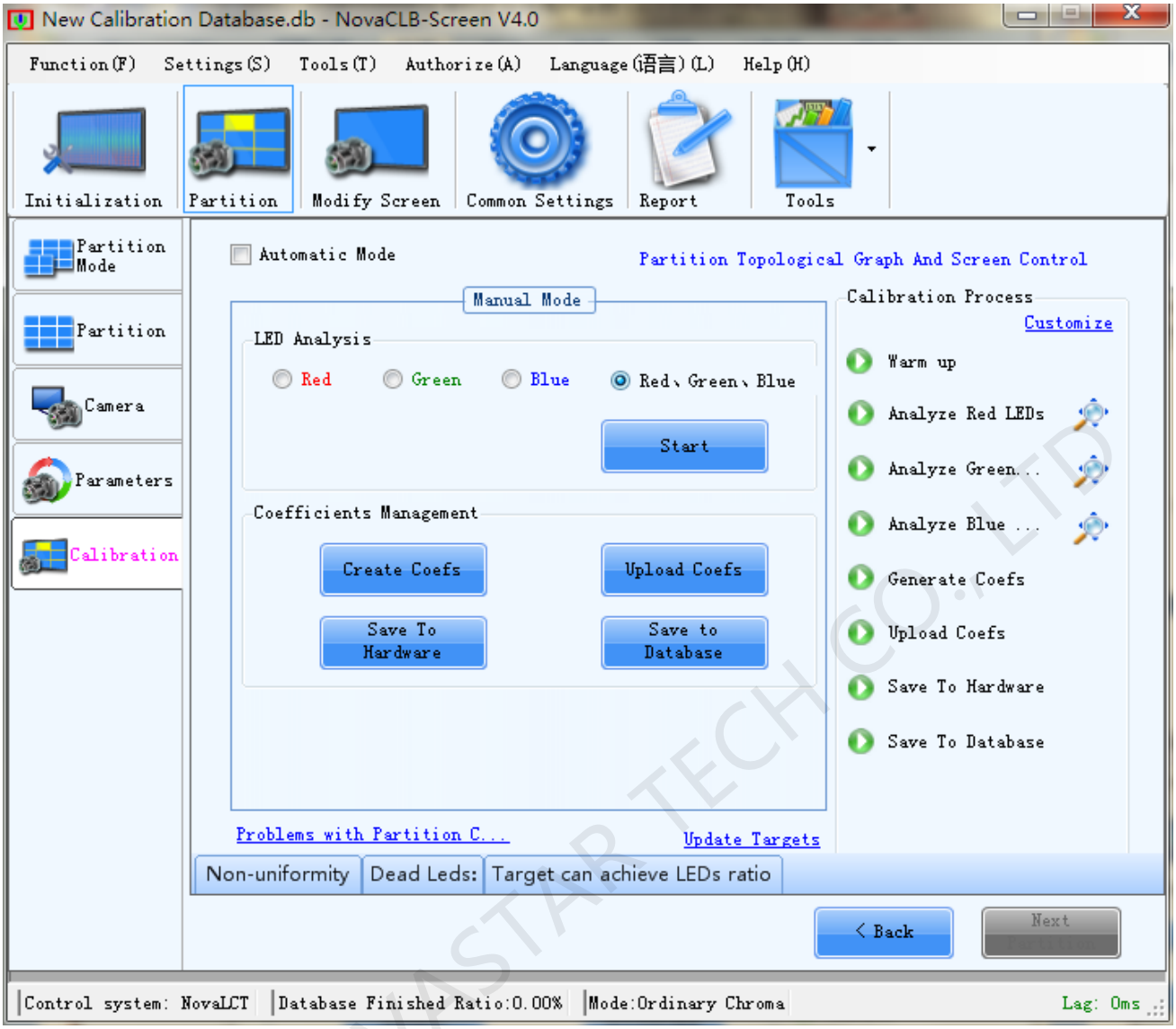


Fig. 3-36 The Calibration Page

1) Preparation

Normal partition supports gap calibration and coefficients uploading stably; Large partition supports enabling gap calibration, system uploading stably and background off. And the operating method is as follows:

Before enabling automatic calibration, click 

at the main interface to pop out the following window (the setting interface for the big partition), tick the corresponding option, click "OK".

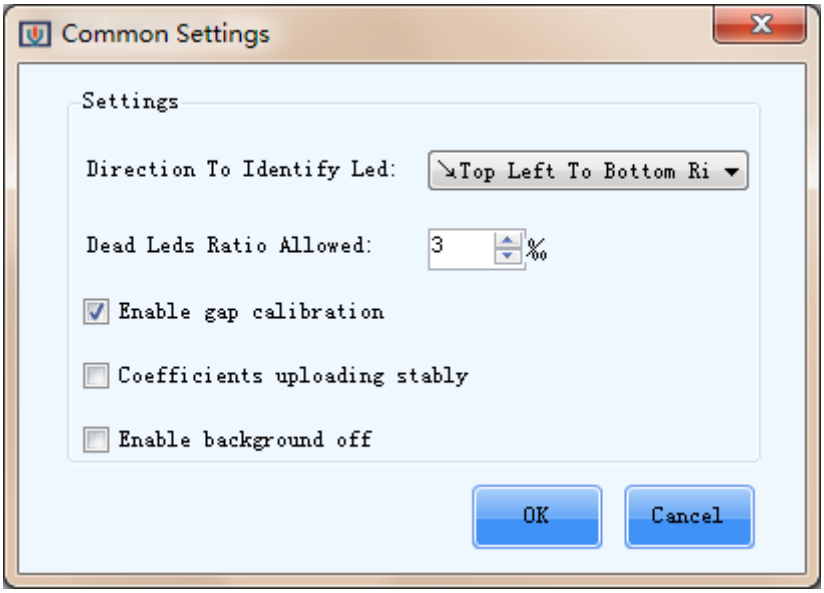


Fig. 3-37 Normal settings for large partition

✧ **Enable gap calibration**

This is an option enabled when Normal partition calibration. Gap calibration is mainly used for small pixel pitch LED displays calibration, to solve the bright and dim line caused by cabinet assembly. Note: bright and dim line must be inside Partitions.

Click "Normal setting" on the main menu to pop up the window below, and then check "Enable gap calibration".

✧ **Coefficient uploading stably**

Coefficient uploading stably means to upload calibration coefficient via serial cable, the speed is slower but stable. Default calibration coefficient uploading route is via DVI cable, the speed is faster. If there's something wrong with DVI cable, serial cable can be used as alternative by selecting coefficient uploading stably.

NovaPro support two mode of uploading, and the default is quickly uploading mode.

✧ **Enable Background off**

Background removal is to remove background light, which is an option enabled when large partition calibration. Generally, calibration is required only to be conducted under relatively dark

environment, but if background removal is enabled, calibration can be conducted even if the environment is not dark enough.

After "Enable background off" is selected, the interface shown in Fig. 3-36 is displayed. Users can use the mouse to drag the four vertexes of the quadrangle to select the valid area to be calibrated. The unwanted light around the screen to be calibrated is removed.

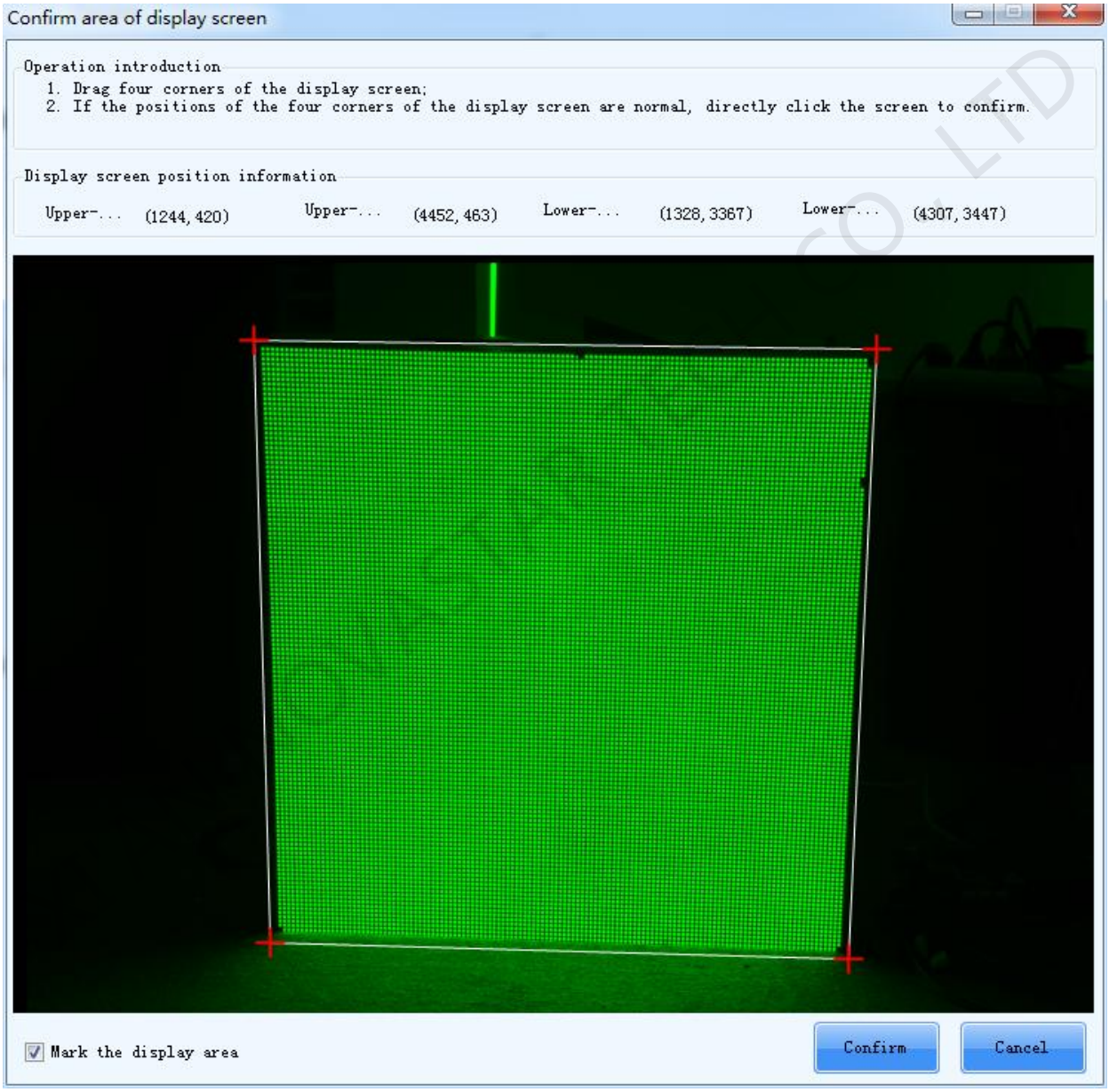


Fig. 3-38 Screen Area Determination

2) Start Calibration

✧ **Automatic calibration Mode**

Users just need to click "Start" button, the software can do the following things automatically: analyze red, green and blue led, generate coefficients, upload coefficients, save to hardware and to database. It will make calibration more convenient and efficient. Users may also manage this flow according to their own requirements. Click "Customize" ,you can see fig. 3-38.

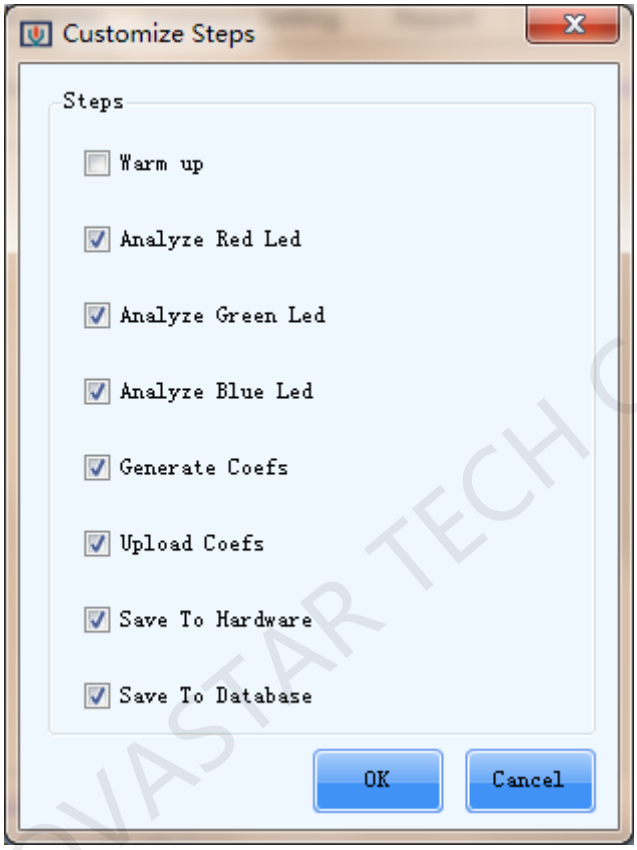


Fig. 3-39 Customize Window

✧ **Manual Calibration Mode**

Users can separately operate every step of the calibration process.

For the partition is completed, users can test whether the calibration effect is good through "pictures control" on the right side of this window. If bad, click "Calibration effect is not good?" on the bottom left corner, check the help documents to help solve the problem. As shown in fig 3-39

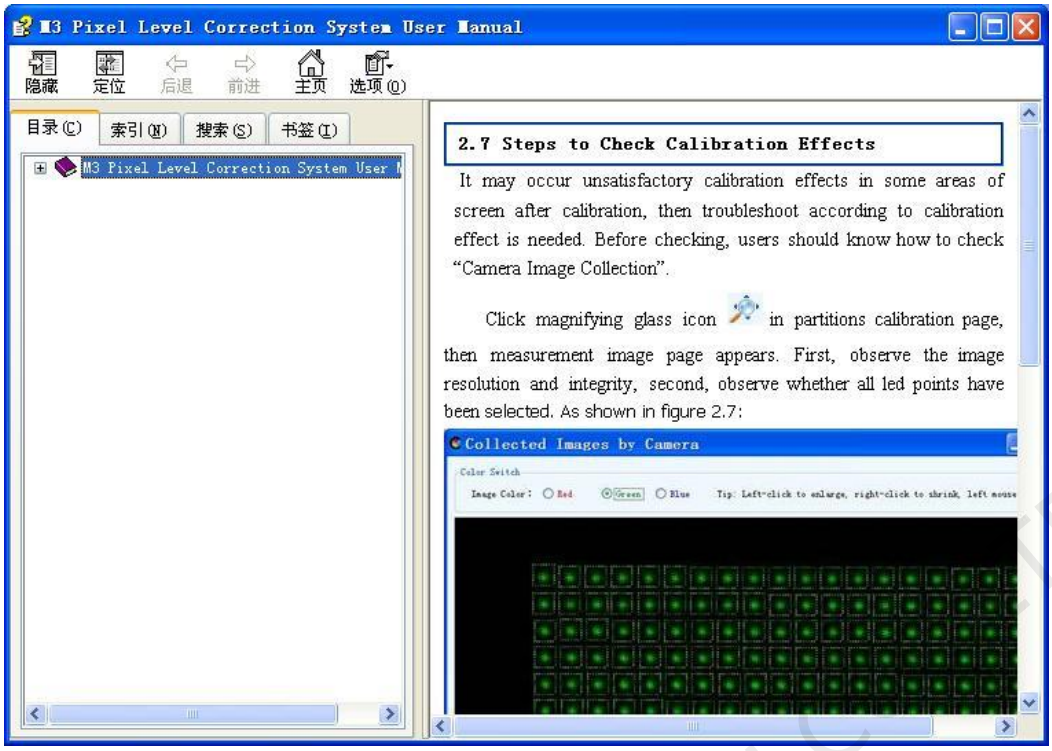
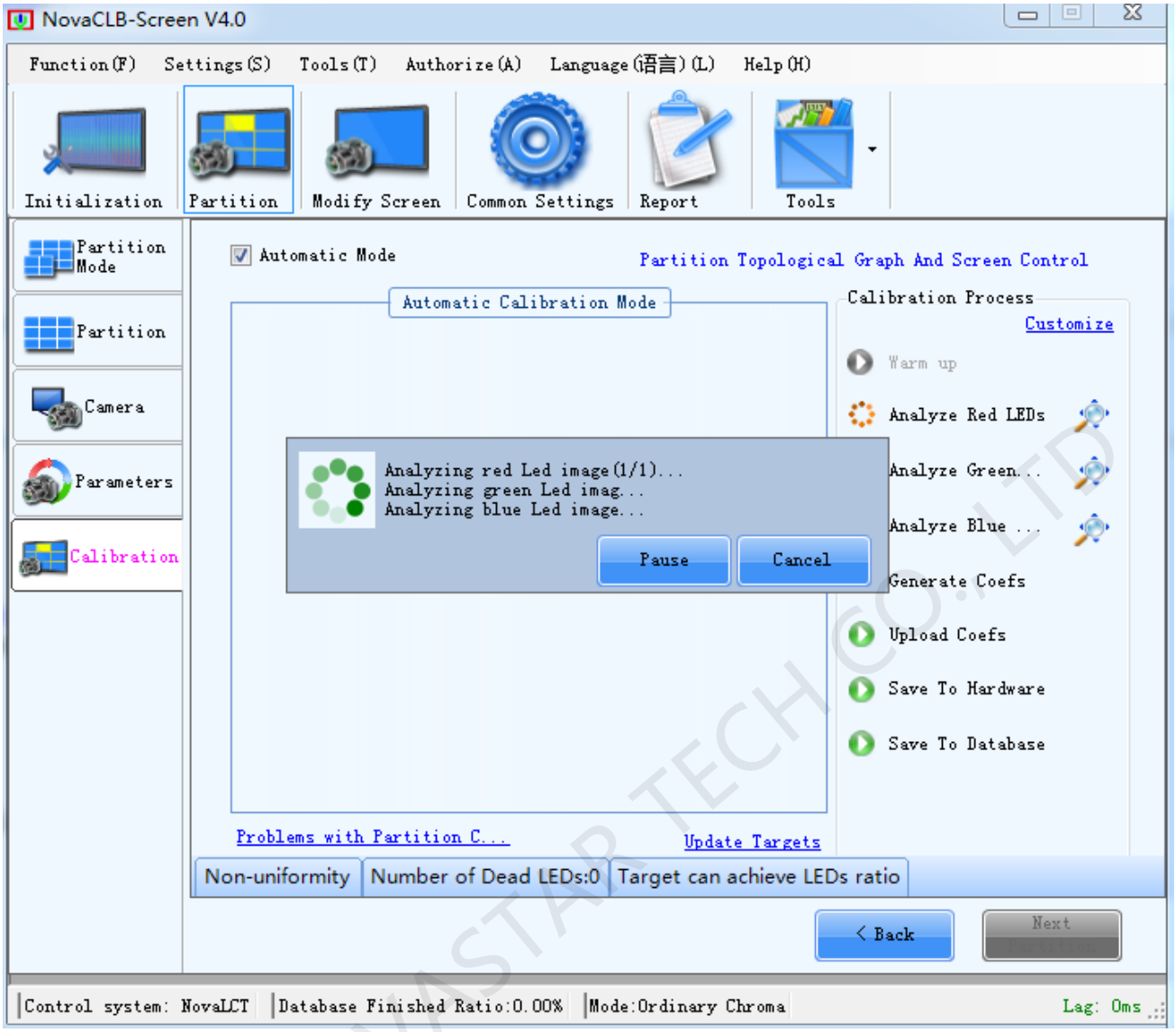
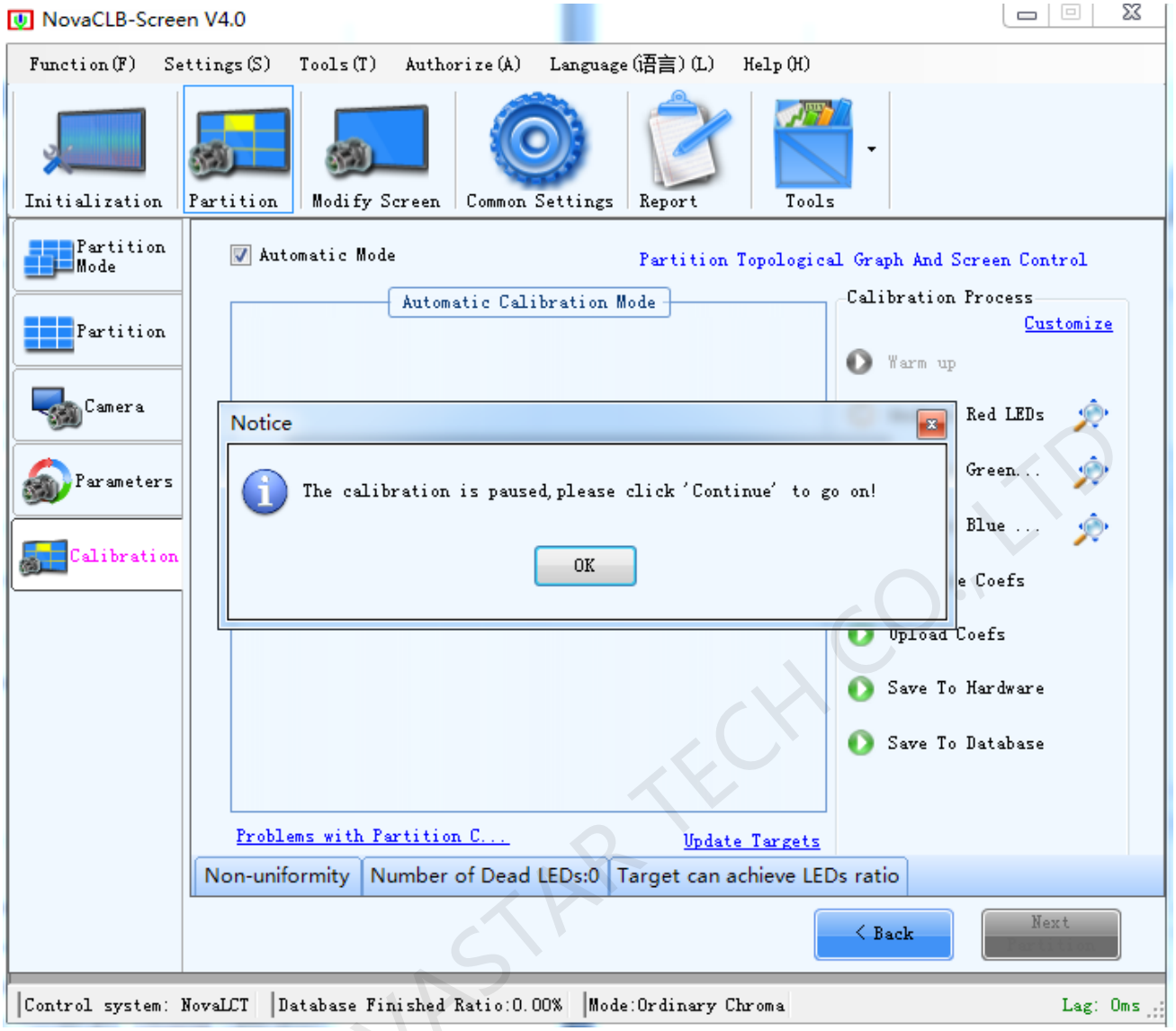


Fig.3-40 Steps to Check Calibration Effects

3) LED Identification Failure(This function is available only in the large partition mode**)**

Some emergency situations may happen during the calibration process, such as sudden appearance of obstruction; user can click Pause to stop calibration under such condition. When user clicks Continue to continue calibration, the camera will start shooting from the last picture.





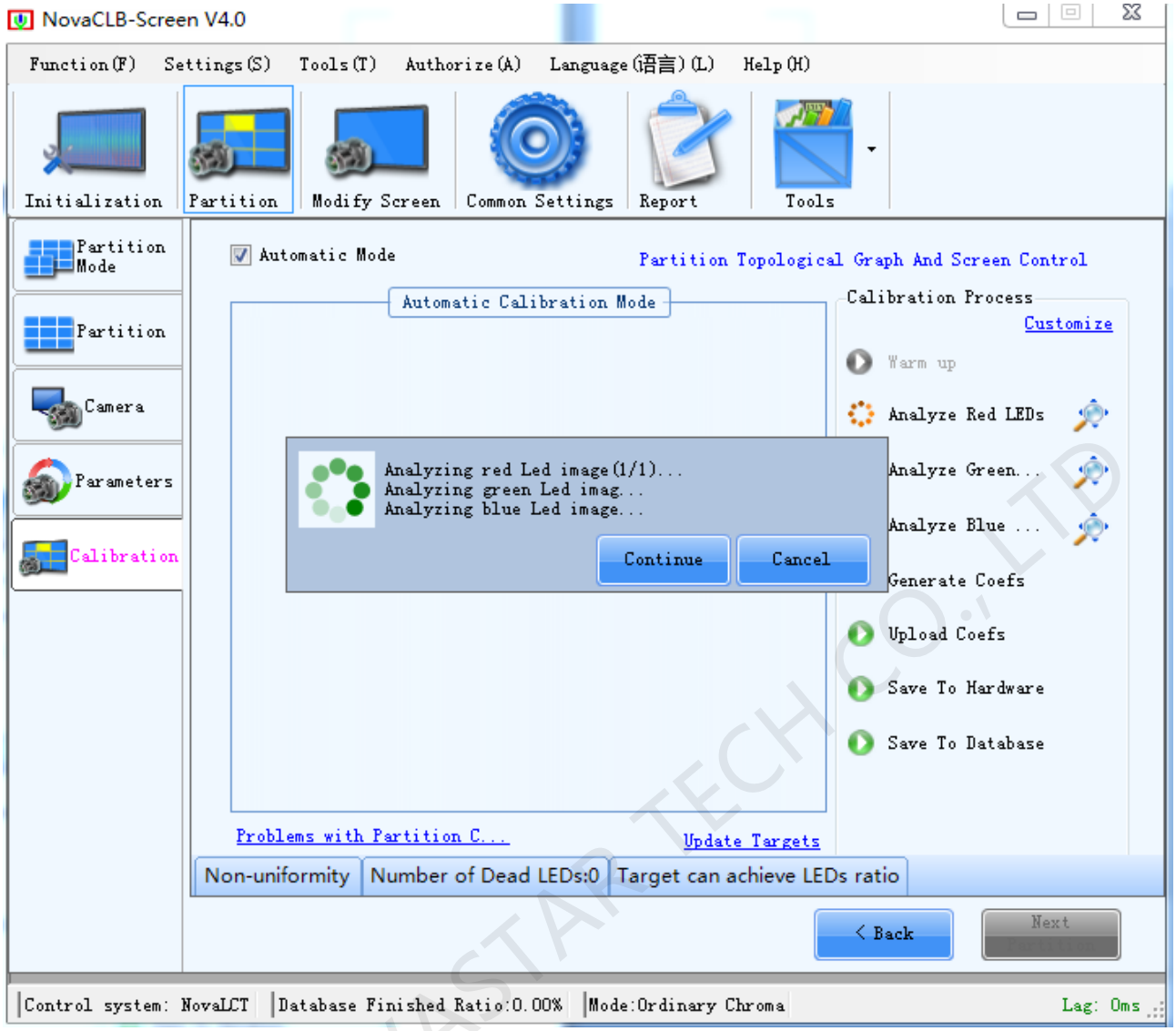


Fig. 3-41 Pause Calibration

4) Change the target value

The user can click Update Targets to change the target value in target calibration interface if the calibration result is not satisfying after partition calibration. Brightness calibration, ordinary chroma calibration and multiple bin chroma are all supported. Multiple bin chroma calibration supports blue calibration which is mainly used for optimizing blue effect.

The user can input the value manually or modify the target value with auxiliary tools. Click  to view gamut distribution diagram after modification.

Fig. 3-42 Change the target value

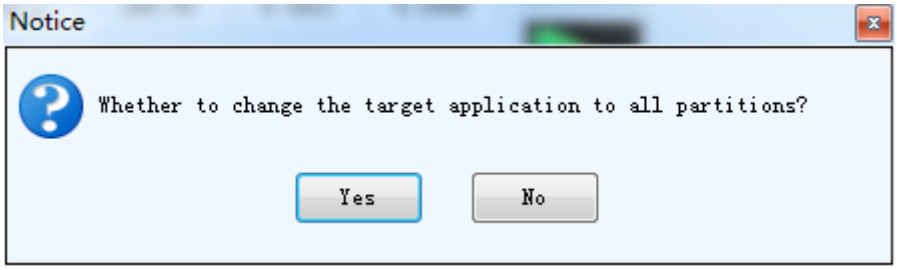
Restore: Restore the calibration mode and target value to the value shown when the interface is opened just.

Preview: View the effect on the display after the target value has been modified.

Enable correction: Check this option to view the effect of the latest correction coefficient on the display.

Click 

if the corrected target value is satisfying, and thus the system will prompts "Whether apply the corrected target value into all partitions?" Check 'Yes', and thus the system will recalculate the corrected correction coefficient of partition and load the new one. Click "No", and thus the target value will only be applied into the partition needs correction.



Click "Next Partition" to enter into the next partition calibration after partition calibration, and one by one complete all partitions of the screen. When all finished, if still exist difference among these partitions, then start "Full-screen Calibration" to eliminate it.

3.3.5 Partition Boundary

When "partition" is conducted for the normal partition, if "Eliminate the boundaries of partitions" is ticked and there are more than two partitions, it will enter the interface of "Partition Boundary" after completion of calibration.

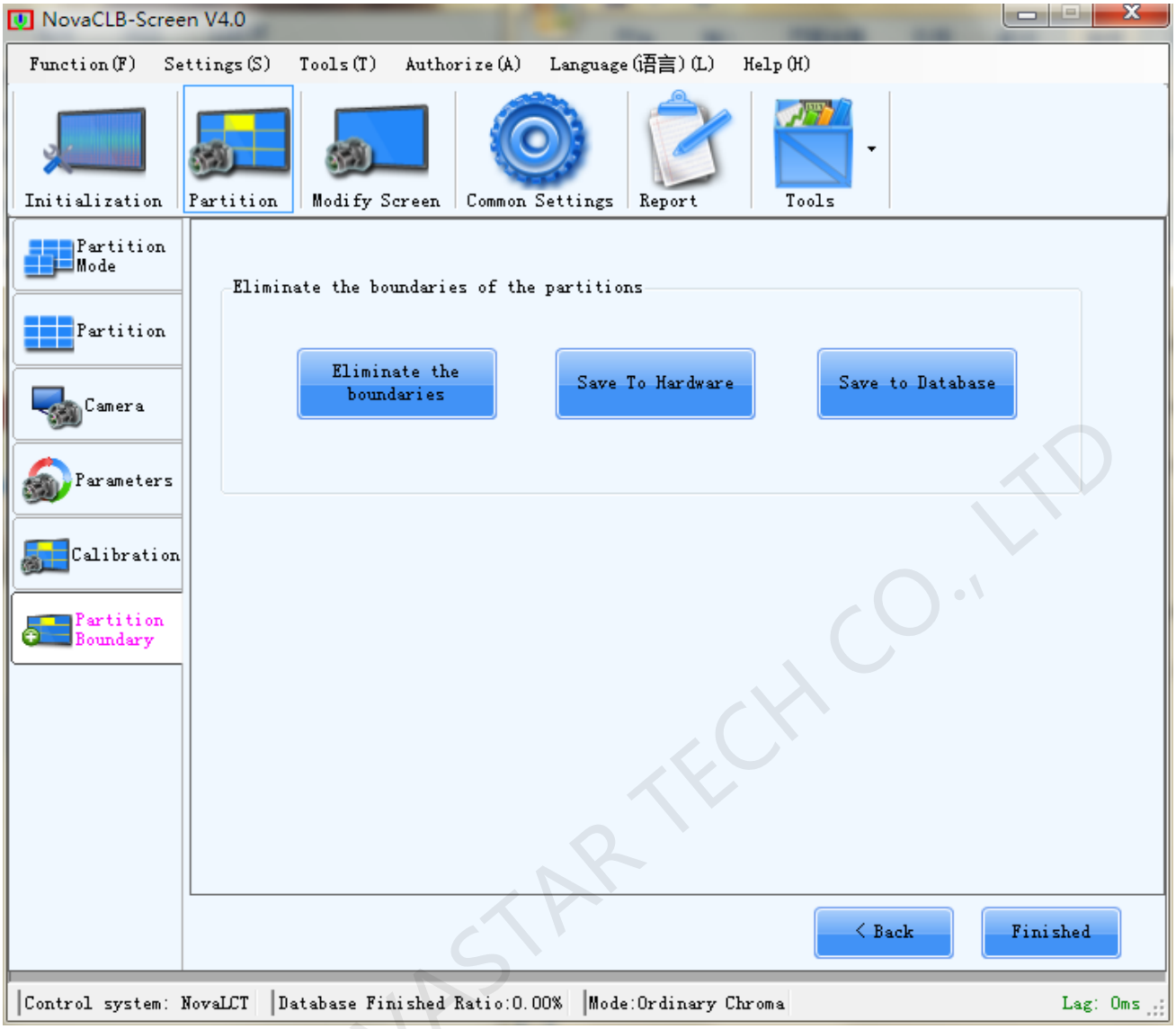


Fig. 3-43 Partition Boundary

Eliminate the boundaries: To eliminate the boundaries of all present partitions.

Save To Hardware: Coefficients of partition calibration are saved to hardware, they will not be lost in case of blackout.

Save to Database: Coefficients of partition calibration will be saved to database.

3.4 Modify screen

Full-screen calibration is used to eliminating the differences among partitions, improve uniformity of the display screen. But users must notice that the precondition is the database created by

Partition calibration must be all saved.

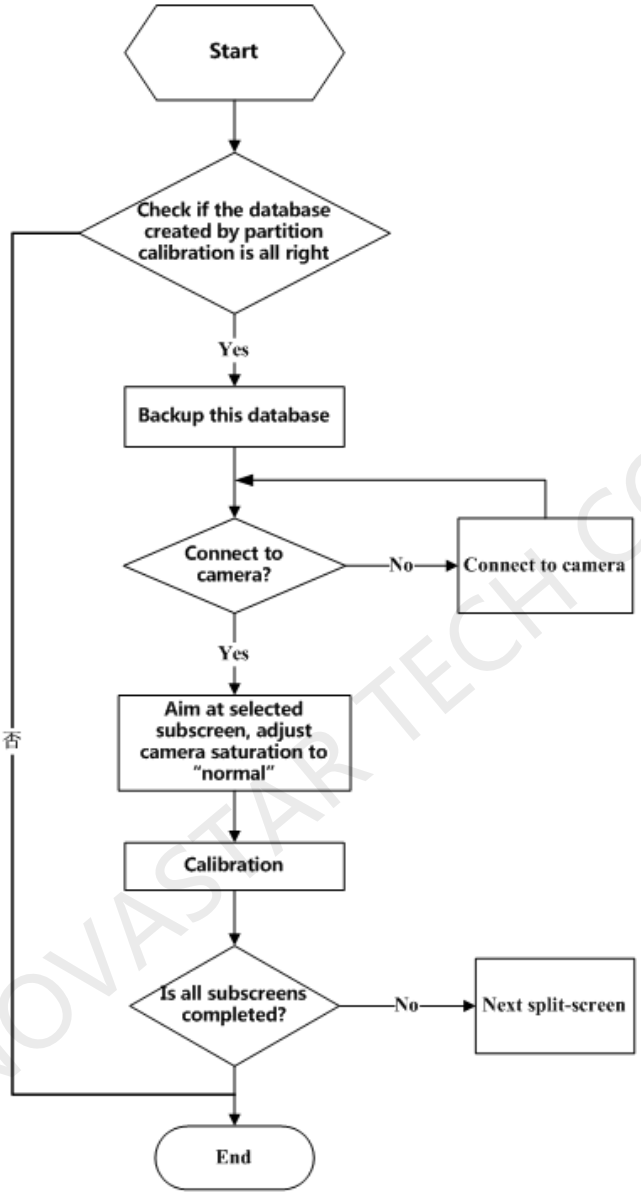


Fig. 3-44 Modify screen Calibration Flow Diagram

3.4.1 Sub screen

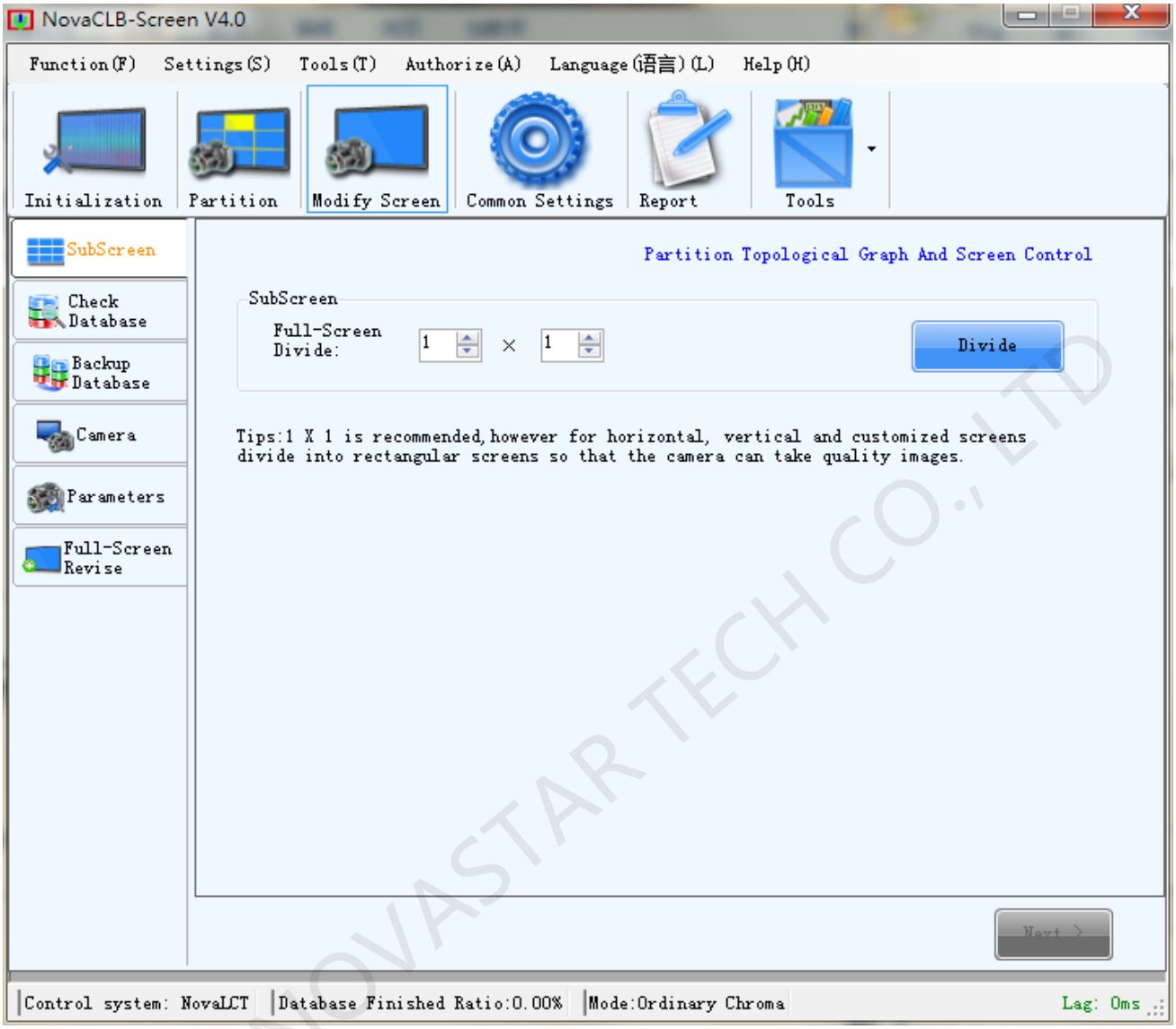


Fig. 3-45 Sub screen

Sub screen

Divide display screen into several sub screens, it' s size is generally recommended 1*1, if the screen is vertical strip or horizontal strip, you may set 2*1 or 1*2 to let camera obtain more clear images.

3.4.2 Check The Database

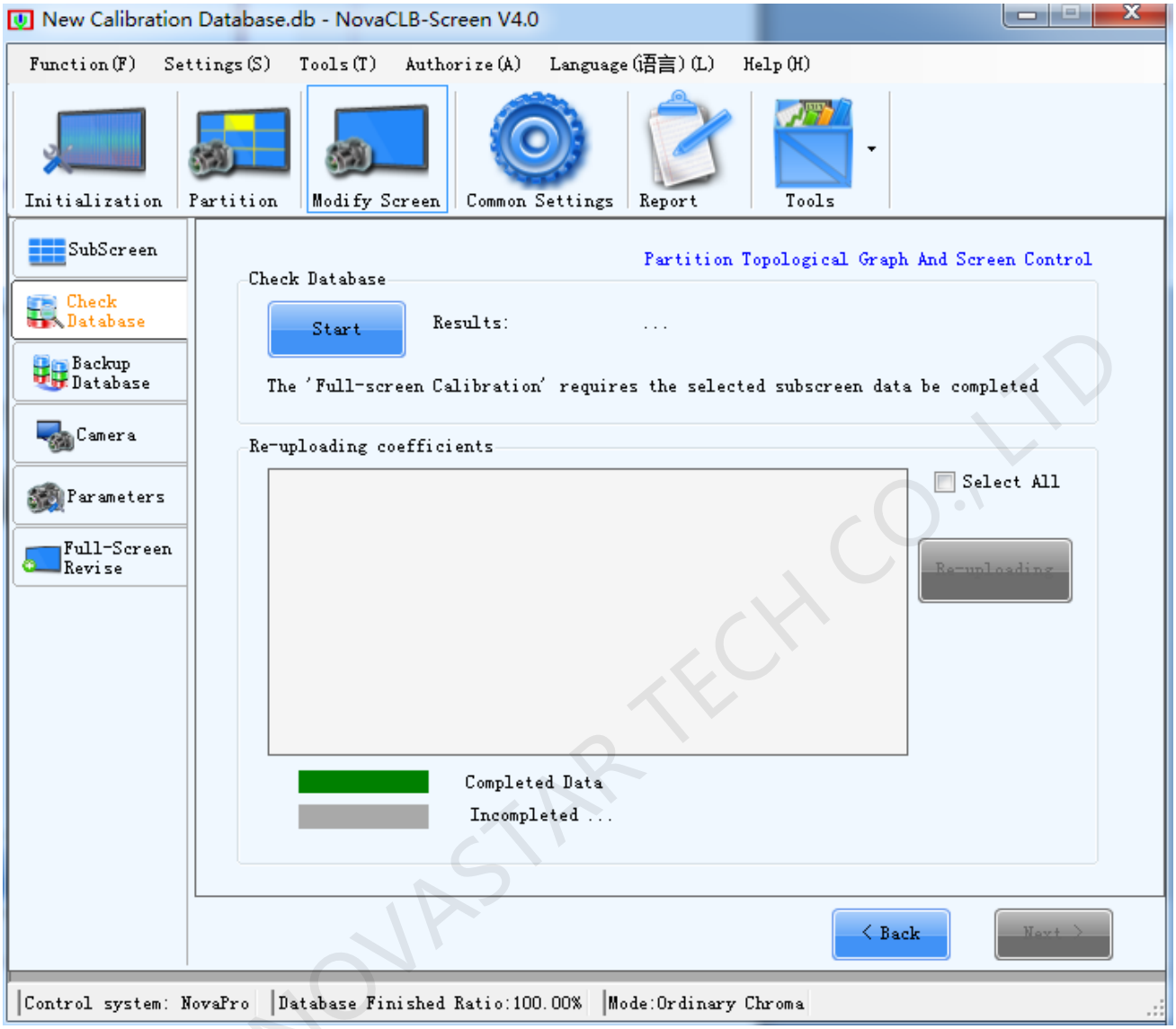


Fig. 3-46 New Revise Database

Check Database

The software will check if the database is all right, check results will show in the white rectangular, the green stands for yes while gray stands for no. To the screen whose database is all right, click "Re-Uploading".

If the screen calibration coefficient has already been not in conformity with the database, it is required to click “Select All”, and re-upload.

Only whose database is all right can do full-screen calibration. After check, click "Next" to enter into "Backup Database".

3.4.3 New Revise Database

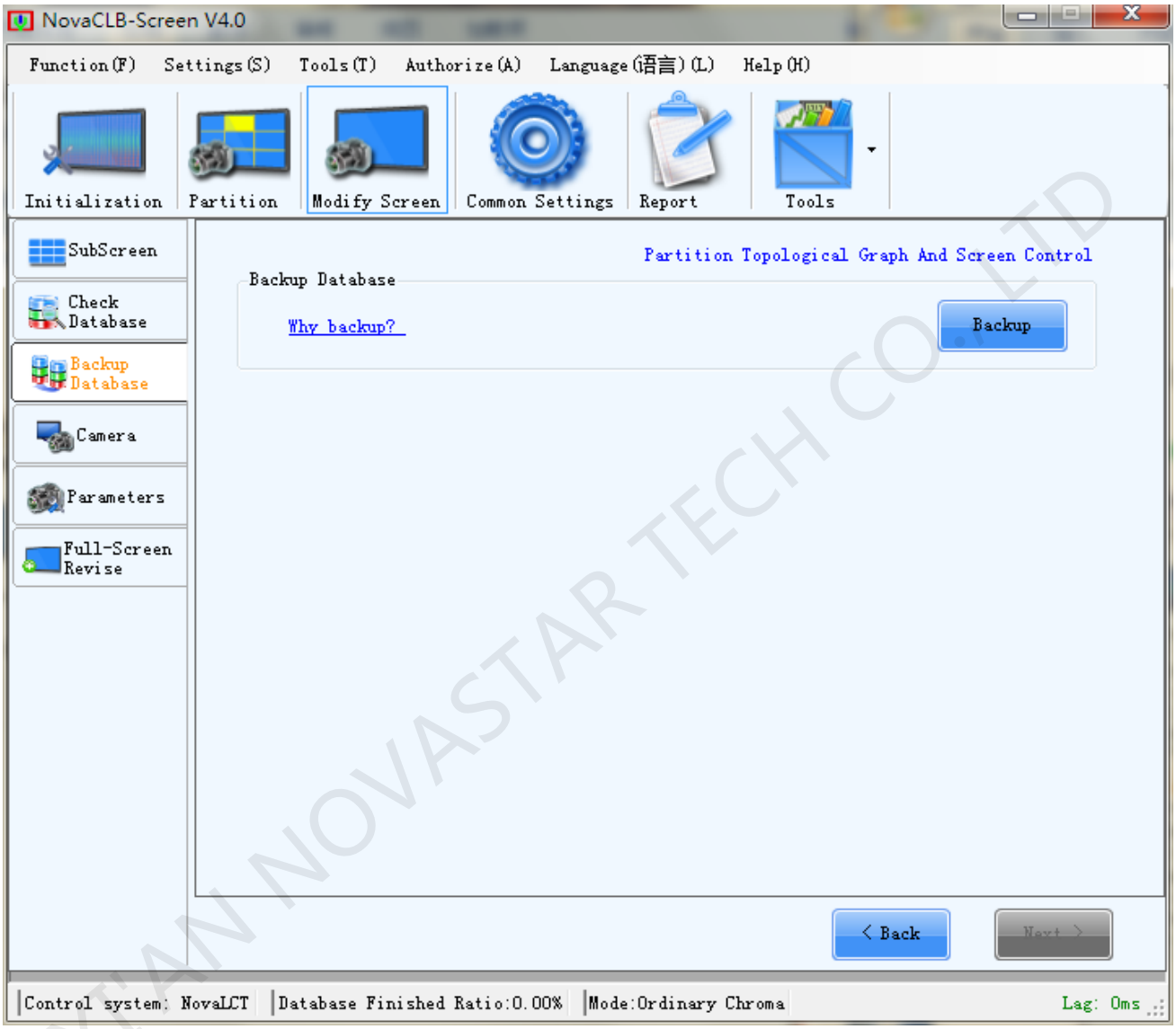


Fig. 3-47 Backup Database

Backup Database

Full-screen calibration may update coefficients in the database, thus we need to backup database to guarantee the original calibration coefficients unbroken. When you backup the database you'd better indicate that it is created by Partition calibration to prevent confusion. The backup database should be properly kept, when full-screen calibration failed affected by the

surroundings, you can use the backup database to do full-screen calibration again.

When completed, click "Next", enter into "Connect to camera".

3.4.4 Connect To Camera

The same as 3.3.2.

3.4.5 Camera Parameters

The same as 3.3.3, what should users notice is, when doing full-screen calibration, the camera imaging doesn’ t have to be clear, adjust it a little fuzzy will be better.

3.4.6 Full-screen Revise

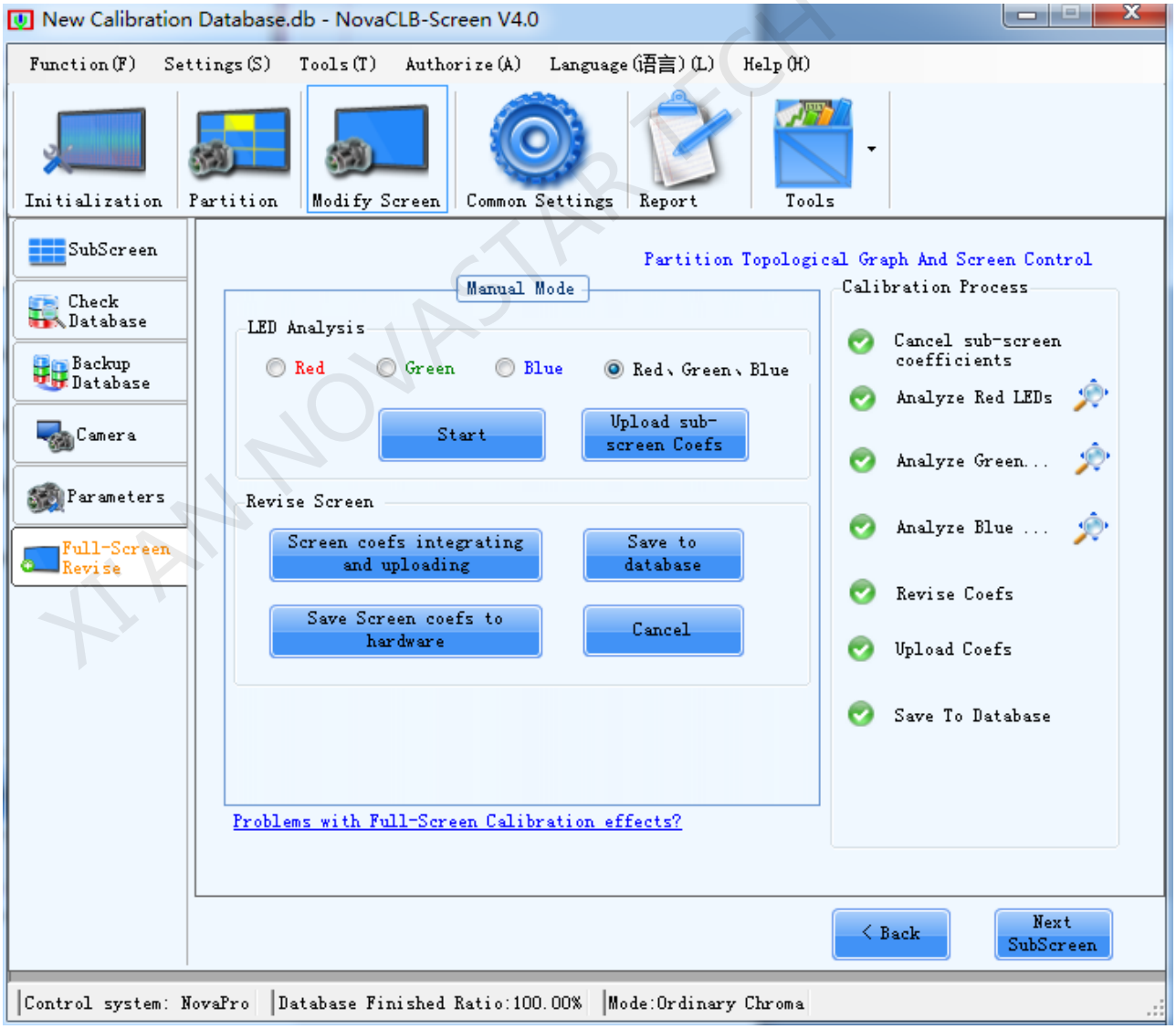


Fig. 3-48 Page Of Full-screen Revise

Full-screen Revise

Be sure to aim the camera lens at the selected sub-screen, and then click "Start" to automatically fulfill such functions as "Cancel sub-screen coefficients" and "Analyze Red, green, blue LED". "Cancel sub-screen coefficients" is to cancel the coefficients that are not saved, and "Analyze Red, green, blue LED" requires partition effect;

then the software will do the following things automatically: Control screen display colors, manage camera gain pictures and analysis intelligently. And the corresponding process can be seen on the right of the page.

If the sub-screen effect is good, click "Upload sub-screen Coefs" to automatically fulfill such functions as "Revsie Coefs", "Upload Coefs" and "Save to Database".

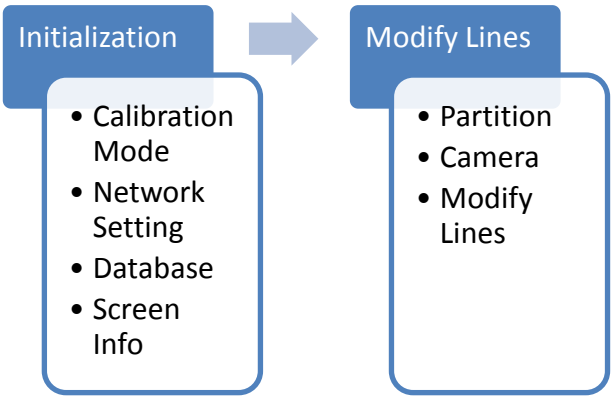
Make calibration for the sub-screens one by one. After the calibration, please keep the calibration database with due care; when calibration to all sub-screens is completed, click "screen coefficients integrating and uploading" to upload the screen coefficients; if the full-screen calibration effect is good, click "save full-screen coefficients" and "save to database".

So far, that's all for all calibrations.

Attention: please be sure to confirm the full-screen calibration effect before save to database, or partition database shall be loaded to do full-screen calibration again.

4 Modify dark or bright lines

The bright/dark line on the display can be adjusted by the function of **modify dark or bright lines** when it is located at the splice between lamp panels or cabinets. The effect can be very remarkable if the operation is proper. The operation process is as follow:



4.1 Initialization

Correction mode choose "Modify dark or bright lines".

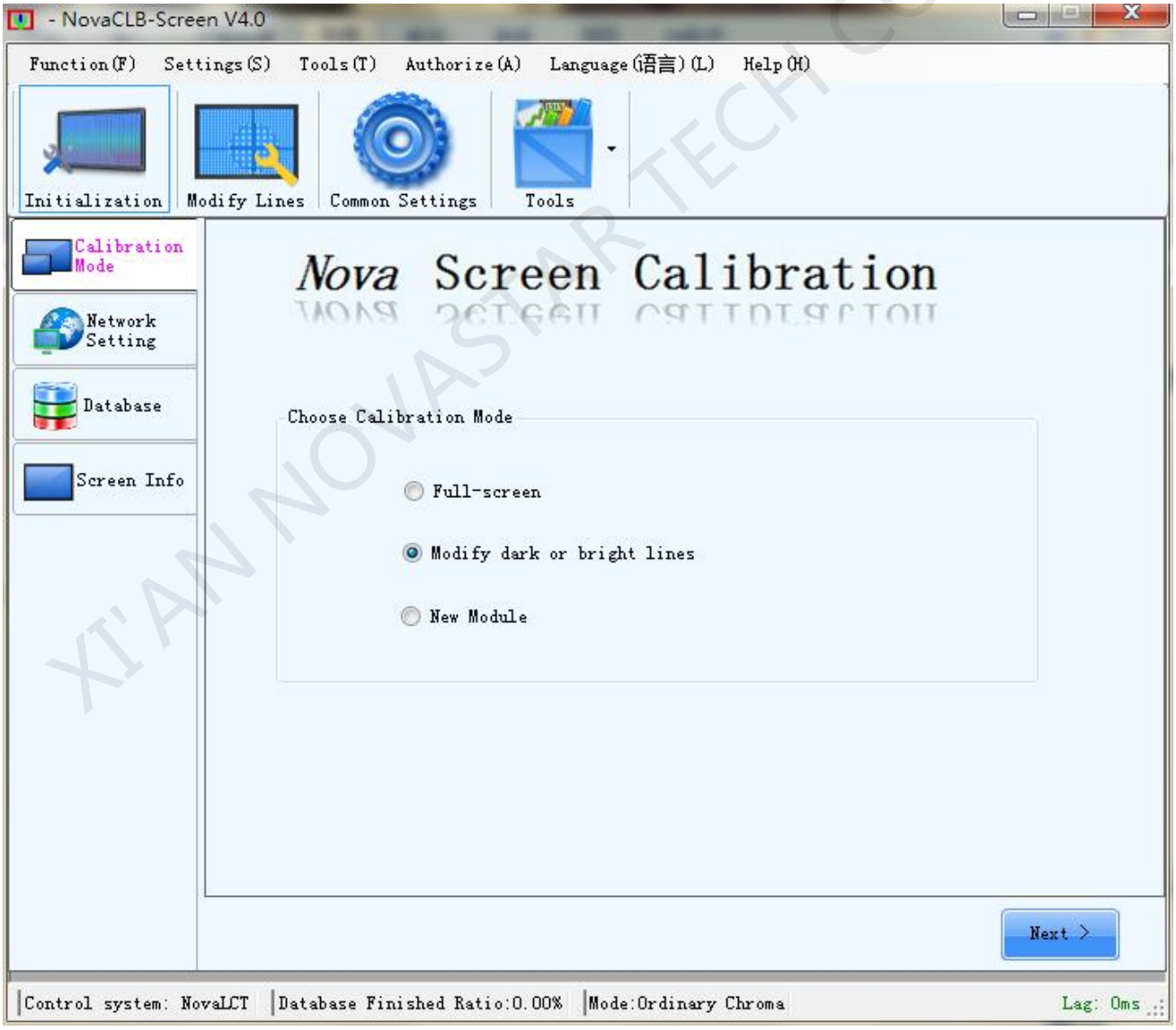


Fig. 4-1 Choose Calibration Mode

4.1.1 Network Settings

Input the IP and port (The port is set to 5200) of NovaPro or NovaCLB-Screen, then click "Connect" button.After NovaCLB-Screen is connected with NovaLCT or NovaPro successfully, the bottom of interface will show display count and the corresponding resolution of connected NovaLCT or NovaPro. User can View the number of pixels of display screen by serial number.(Detailed network settings, please refer to 3.2.2 Network settings)

If connection is failed, users could click Network Settings Guide.

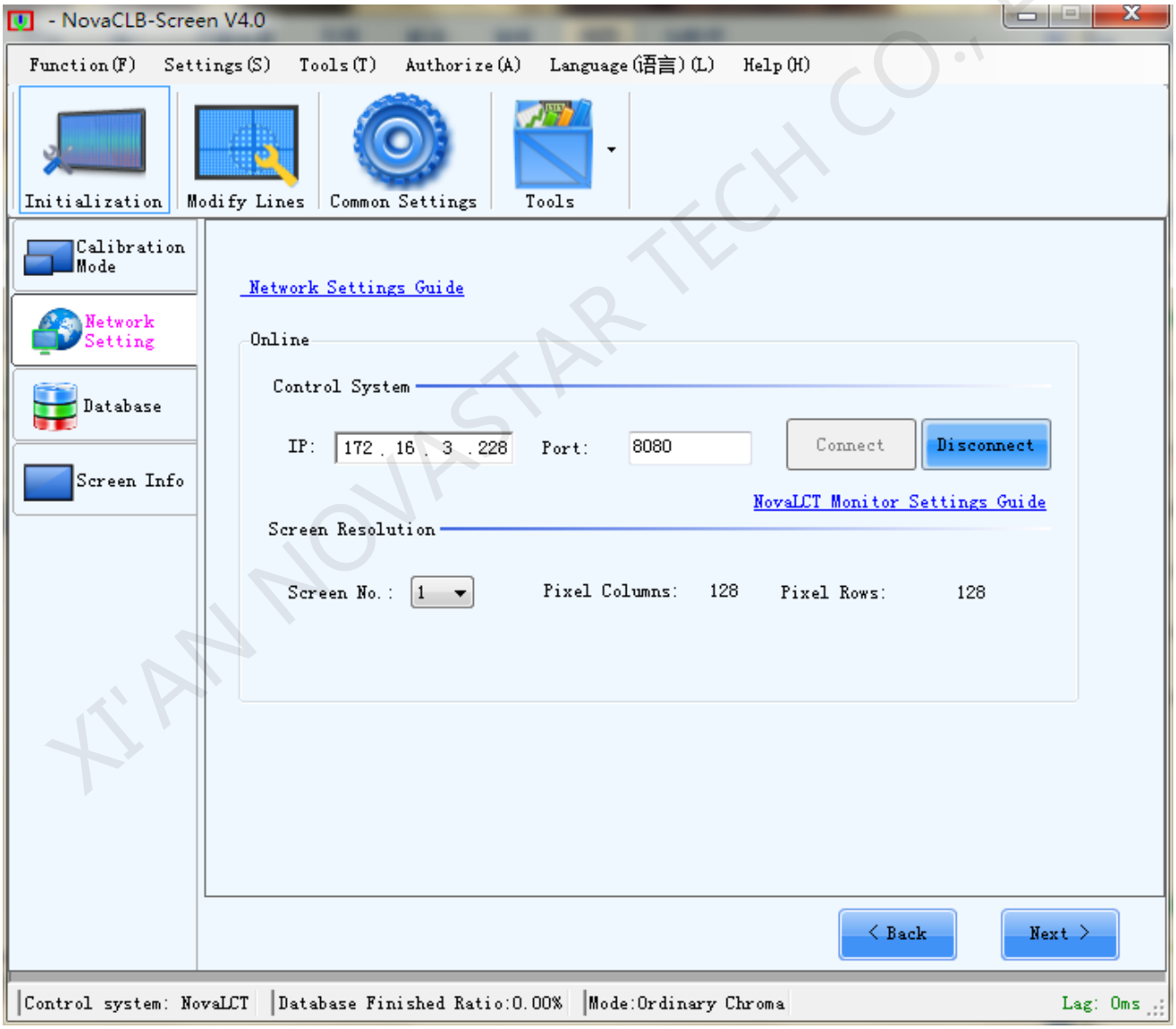


Fig. 4-2 Network Setting for Modify dark or bright lines

4.1.2 Database

To Create a new database; and the database is used for saving information of calibration coefficient, calibration time, screen size, etc. it shall be kept properly.

Software default check the option "backup database", To enable the backup database can effectively prevent database files were damage when abnormal shutdown or the computer suddenly power off .

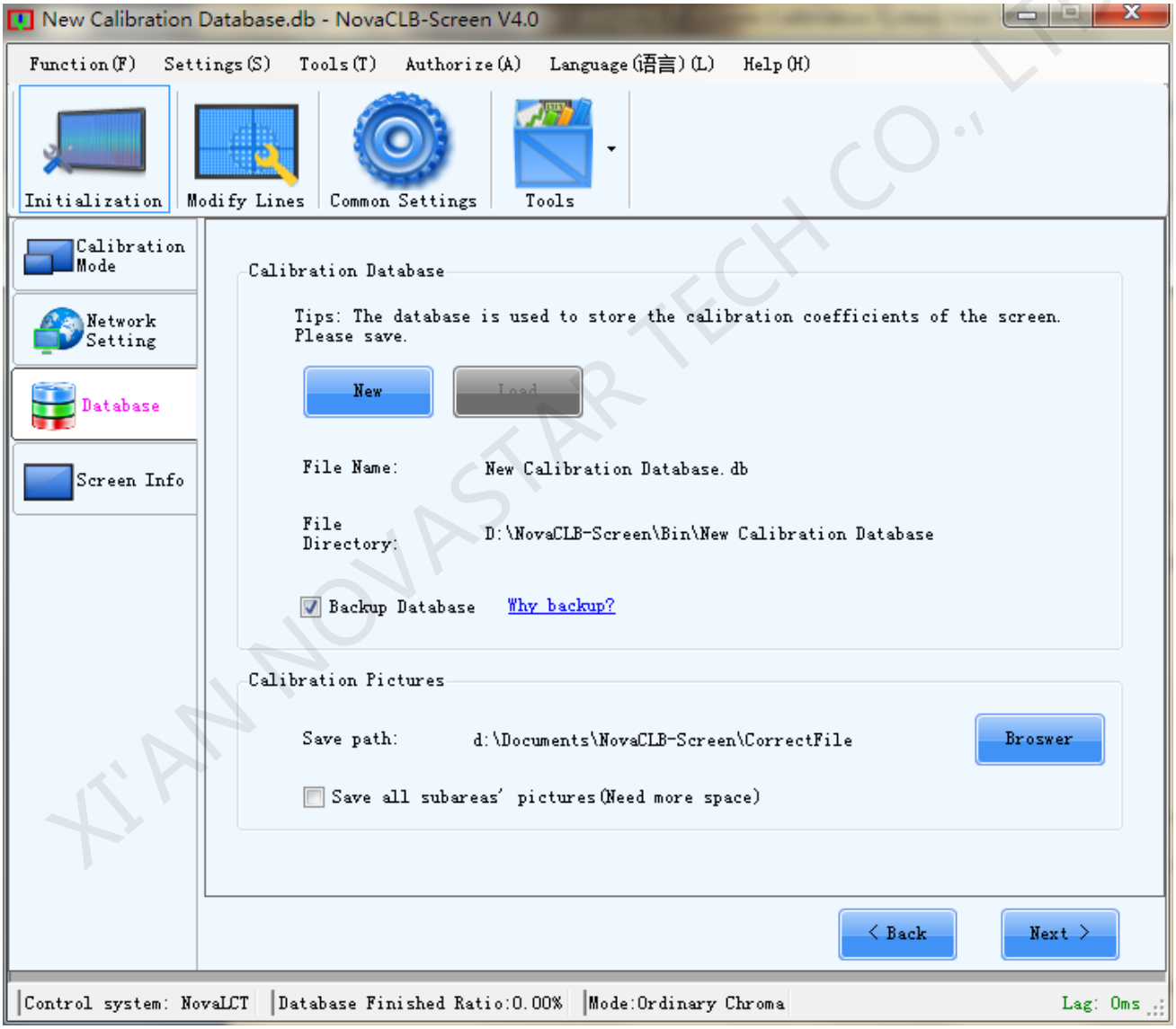
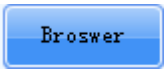


Fig. 4-3 Database setting for Modify dark or bright lines

Calibration Pictures

Click 

to set the position where the collected images are saved during calibration.

For example, check “Save all subareas' pictures” to save the images in all partitions; un-checking the option will only save the images in current partition in default setting.

4.1.3 Calibration Information

The operation process varies with the calibration of display and can be divided into without calibration, Screen calibration and Cabinet calibration. The user need to load database and pay attention to the following items in the latter two situations:

1) Screen Calibration, The full-screen calibration must be conducted with NovaCLB-Screen V4.0 or higher version; moreover, the size of module must be identical.

2) Cabinet calibration, the cabinet database must be converted to full-screen database at first.

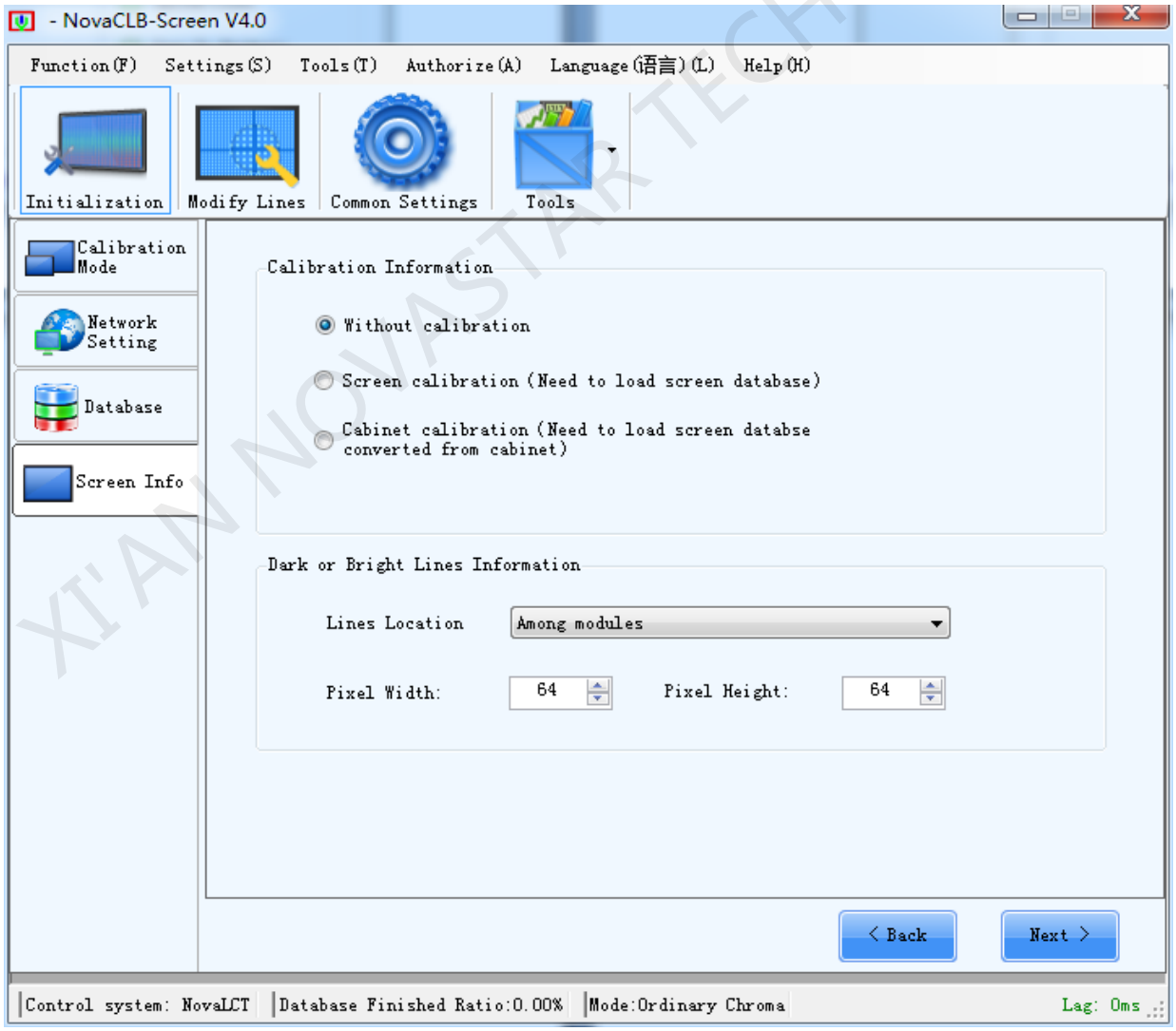


Fig. 4-4 Screen Info for Modify dark or bright lines

Dark or Bright lines Information

- Select the position of bright/dark line among two types: between cabinets or between modules (it is located between cabinets generally).
- Fill in the number of columns and rows of each module.

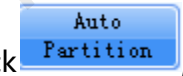
  Click 

after setting to enter the Modify lines.

4.2 Modify lines

Start calibration for bright/dark line after completing calibration initialization. As the camera resolution is limited, the display needs to be divided into multiple areas of reasonable size for calibration.

4.2.1 Partition

Recommend users to adopt intelligent partition. Click 

, and thus the software will automatically divide the display into serveral partitions of reasonable size; users can also select customized partition for calibration.

The size of Unit Block is the smallest one calculated by the system. The size of basic bright is 3*3, that is, nine LEDs as shown below:

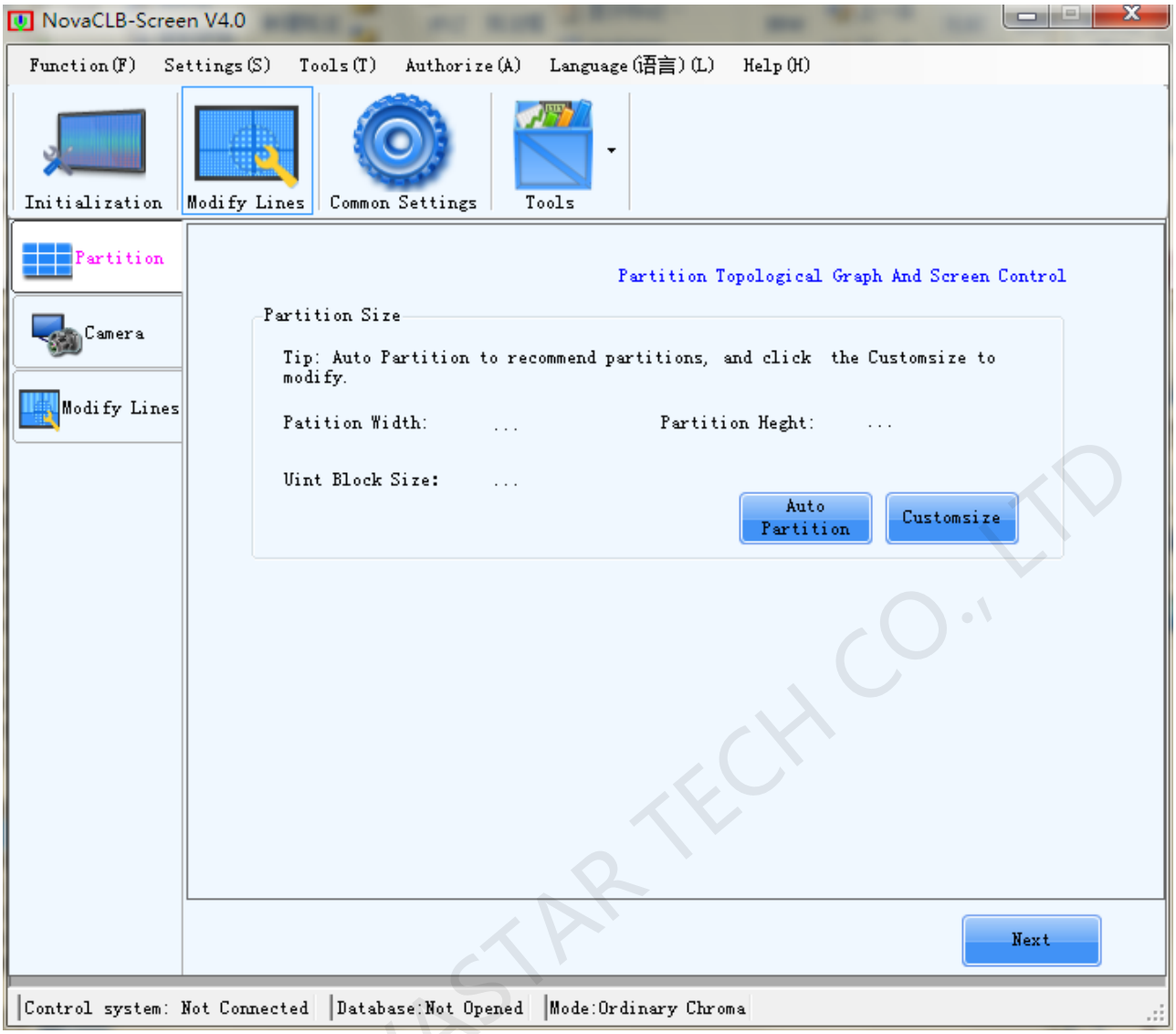


Fig. 4-5 Bright/dark line modification-partition

4.2.2 Camera

When succeed in connecting to camera, the interface appears as follows. You can click help documents on the left to obtain some camera operating skills and partition imaging techniques.

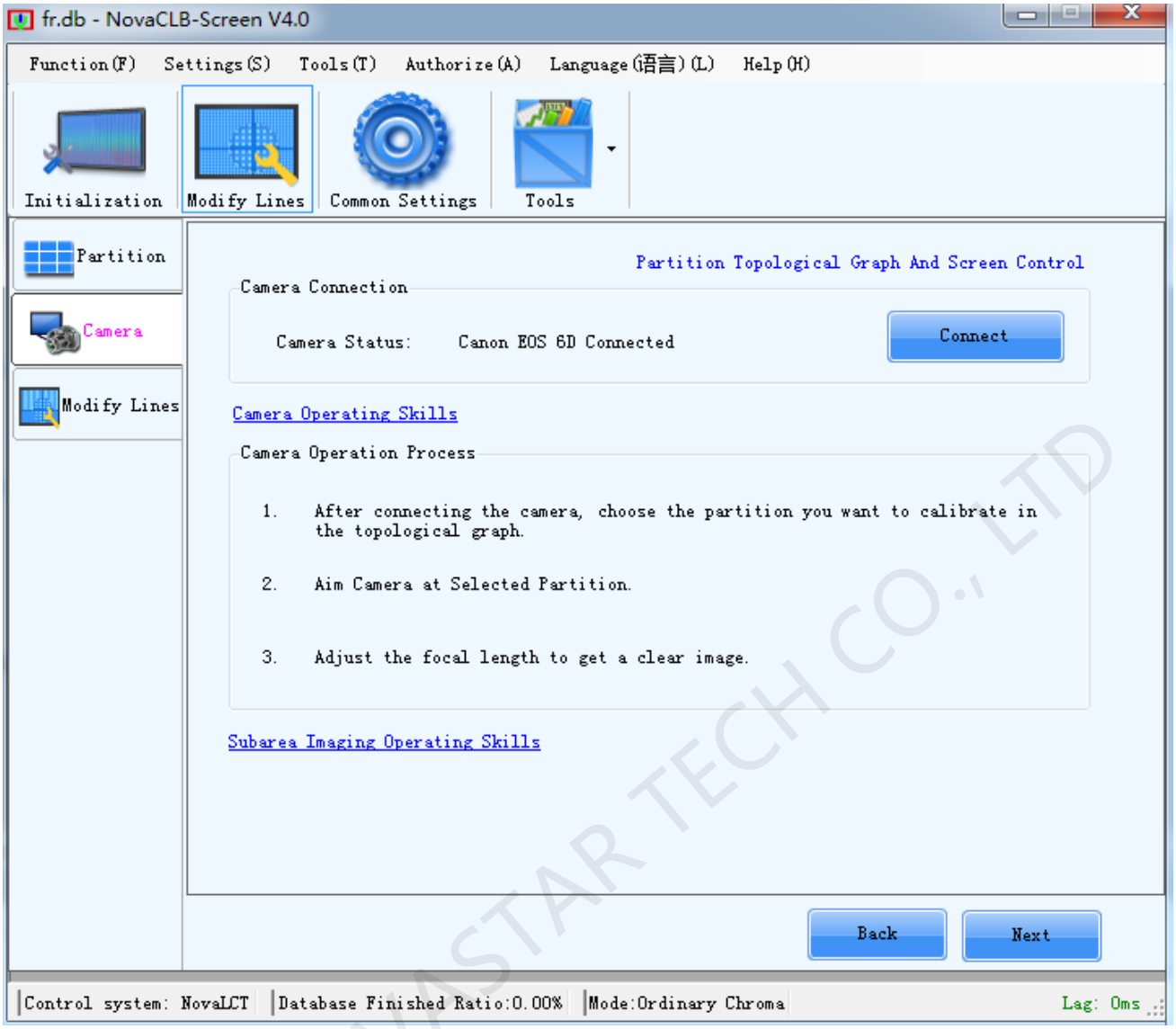


Fig. 4-6 Connect to Camera

4.2.3 Modify Lines

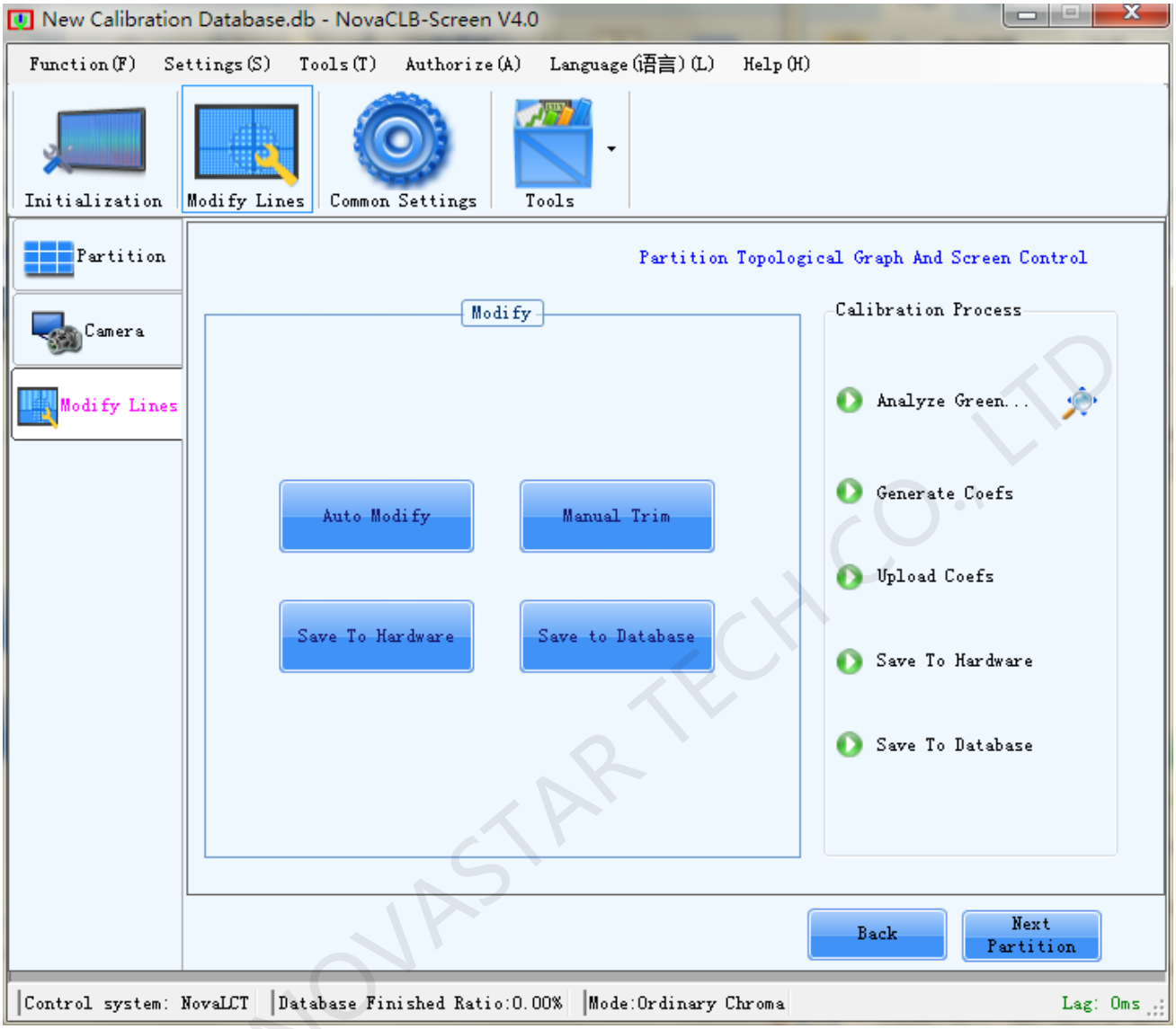


Fig. 4-7 Modify Lines

1) Preparation

Before starting automatic Modify, click 

at the main interface to pop out the following window (the setting interface for the big partition), tick the corresponding option, click "OK".

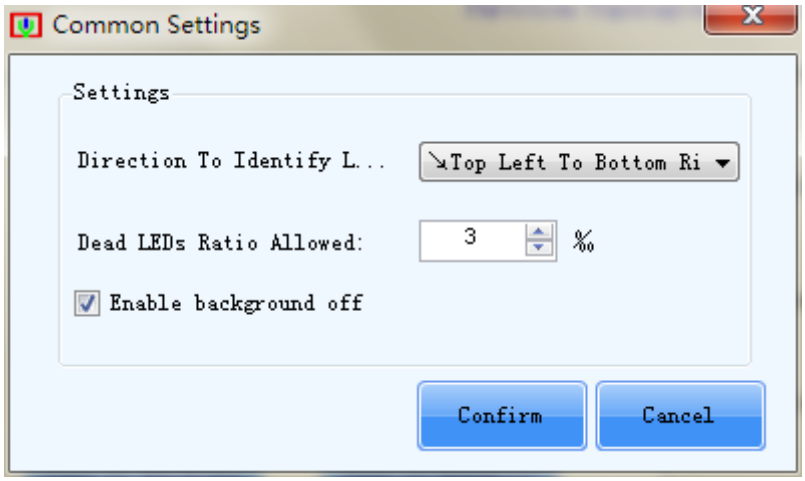


Fig. 4-8 Common Settings

✧ **Enable Background off**

Background removal is to remove background light, calibration is required only to be conducted under relatively dark environment, but if background removal is enabled, calibration can be conducted even if the environment is not dark enough.

2) Automatic Modify

If "Enable background off" is selected, the interface shown in Fig.4-9 will be displayed when start modify. Users can use the mouse to drag the four vertexes of the quadrangle to select the valid area to be calibrated. The unwanted light around the screen to be calibrated is removed.

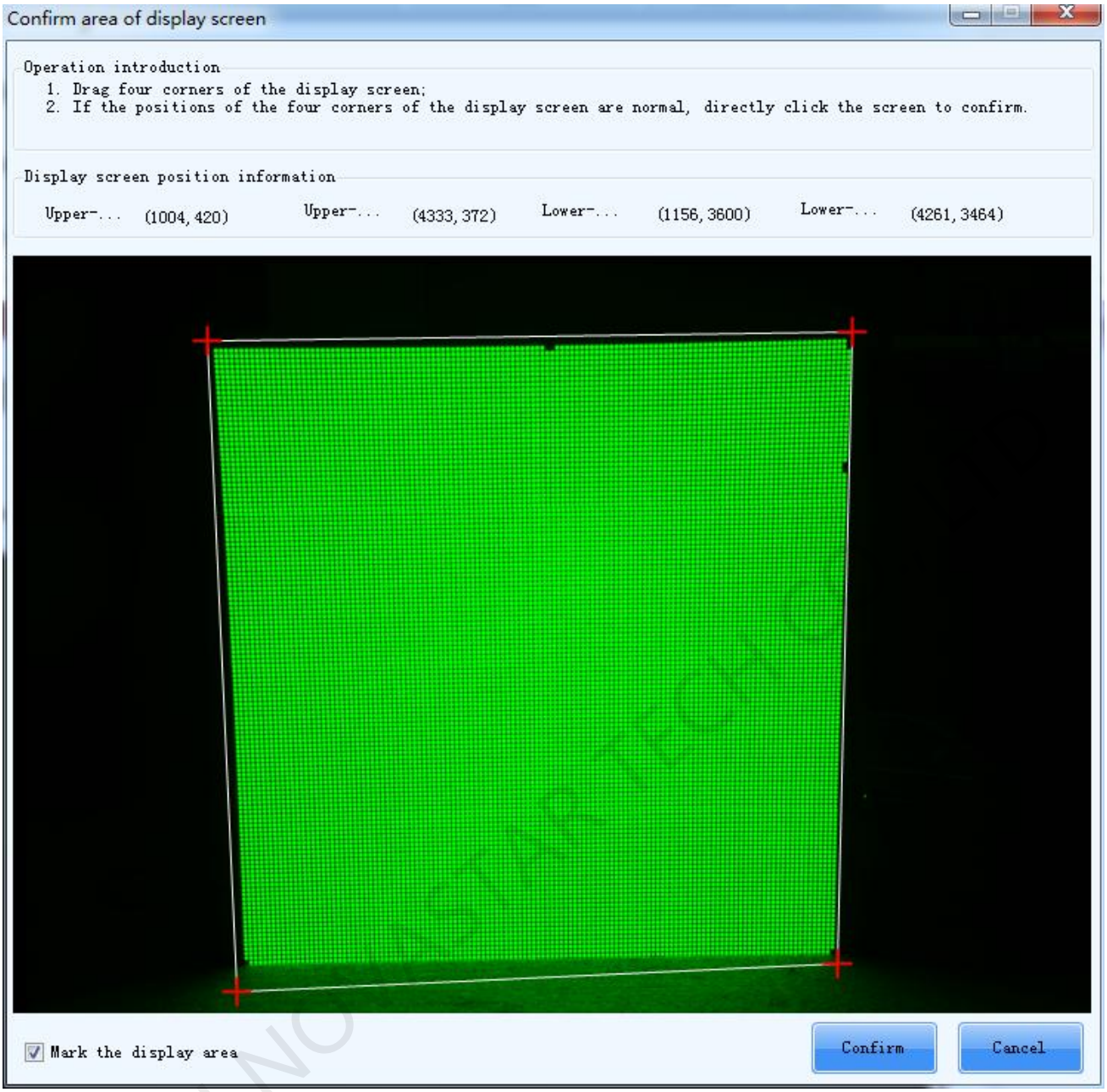
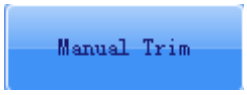


Fig. 4-9 Confirm area of display screen

3) Manual fine adjustment

The user can conduct manual trim if the modification result is not satisfying after auto-modification.

Click 

to enter the fine Manual Trim interface of system as shown below:

Fig. 4-10 Manual trim

Operation step of manual fine adjustment:

a) Users can select the edge or point needing fine adjustment by dragging mouse window or clicking the mouse. Yellow means that the whole edge is selected; green means that partial LEDs are selected.

As both directions in the window option are considered as checked in default setting, the edges in the rows and columns can be selected. If only "columns" is checked in the window option, the user can only check the edge in the columns in the window.

Fig. 4-11 Window-1

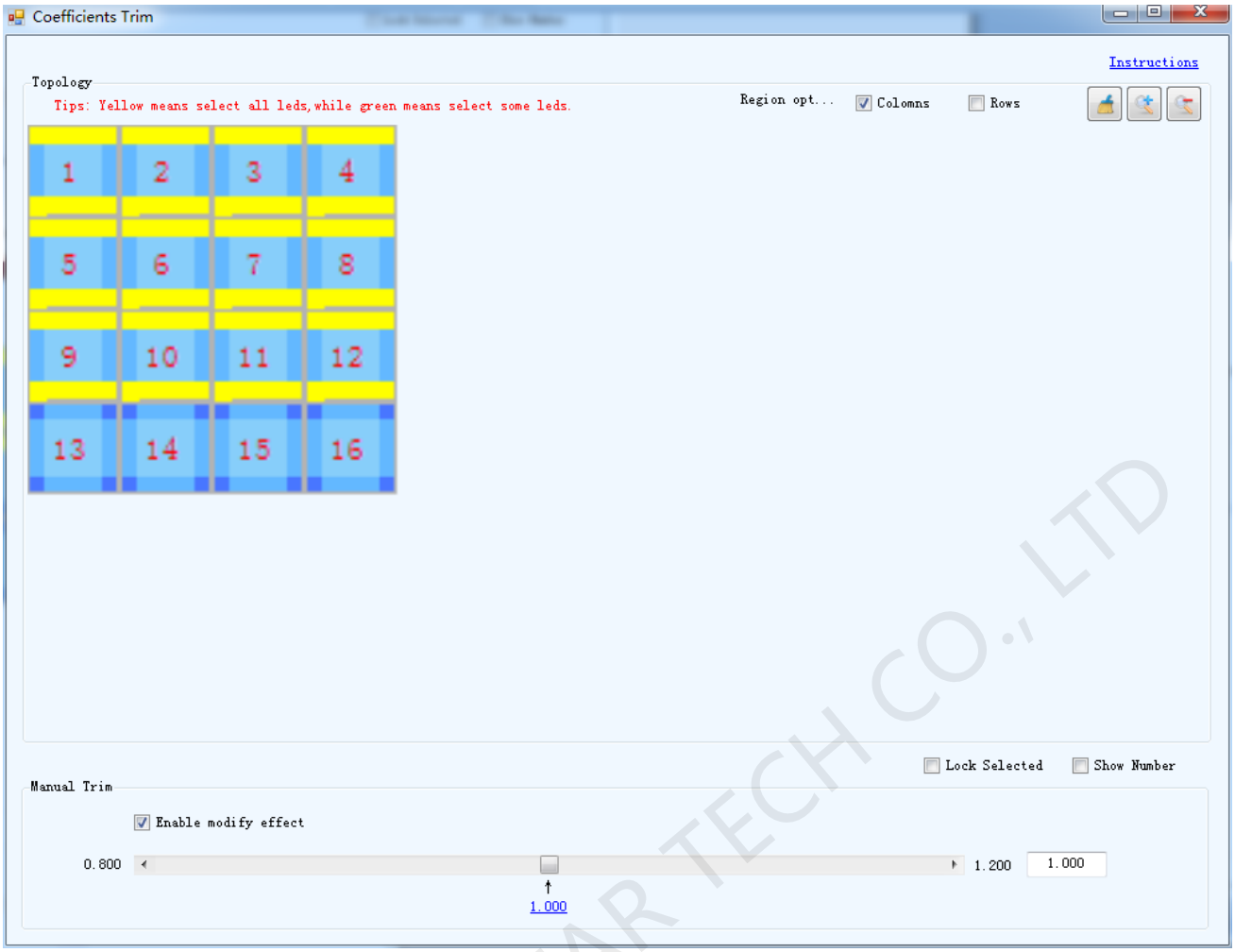


Fig. 4-12 Window-2

The edge needing trimming can be selected with a single click of the mouse.

Fig. 4-13 Clicking the mouse to select the edge to be adjusted

Double-click the edge to pop up the following screen, you can click or select the light spot to be trimmed. Hold Ctrl or shift key to click the mouse to select multiple spots.

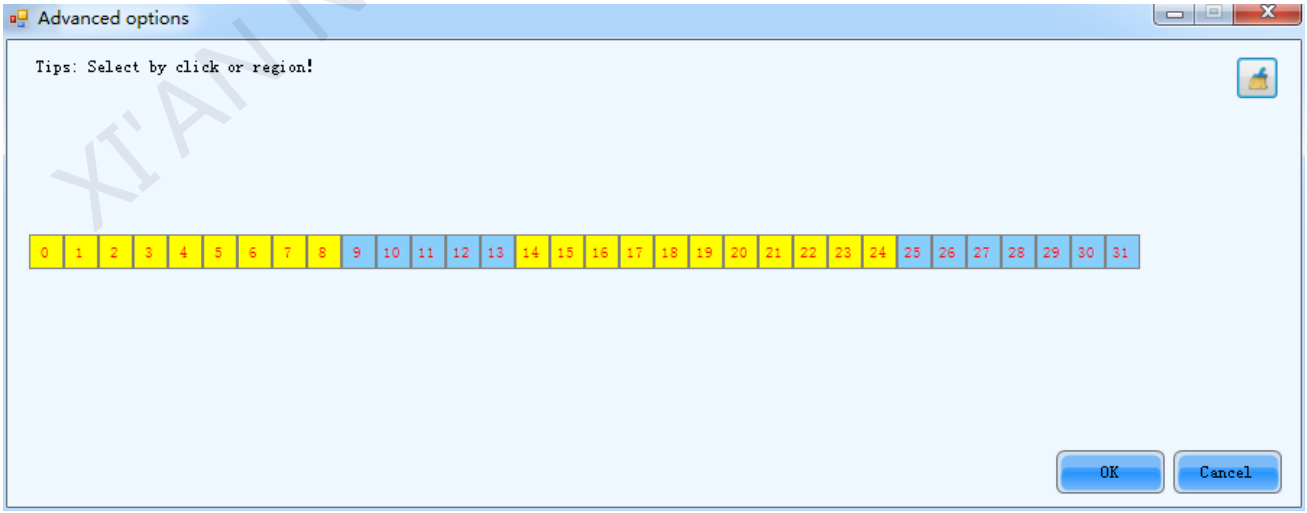


Fig. 4-14 Select the light spots to be trimmed

After selecting the light spots, green indicates the light spots that have been selected, as shown

below.

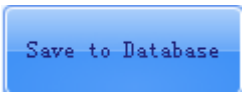
Fig. 4-15 After selecting the light spots

Lock Selected: Lock the selected edge or spot.

Show number: When checked, number will be displayed on the screen.

b) Drag the lever to fine adjust the coefficient. When checking "Enable modify effect", it indicates that trimming is conducted based on the previous correction; when not checking, it indicates that trimming is conducted based on automatic correction.

c) **If the Modify effect is satisfactory, click** 

to save the coefficient to hardware. And then click 

to save the correction coefficient to database.

5 Module Calibration

There are two modes for the replaced module, one is off-line mode, while another is connecting with Control system (LCT or Pro)LCT for online calibration.

It is required to read the average calibration coefficient of the area to be calibrated when conducting calibration to the module under off-line mode, and this coefficient shall be acquired from LCT; after completion of module calibration, the calibration coefficient will be uploaded to the screen through LCT.

The calibration procedure of the off-line mode is basically the same as connecting to LCT mode, which shall be stated together below, and the difference of part of the interface shall be paid attention to.

NovaPro does not support offline mode.

5.1 Initialization

Start the software, directly enter the calibration mode sub-interface of calibration initialization, Choose "New module" of calibration mode, and click "Next", and enter the network setting interface.

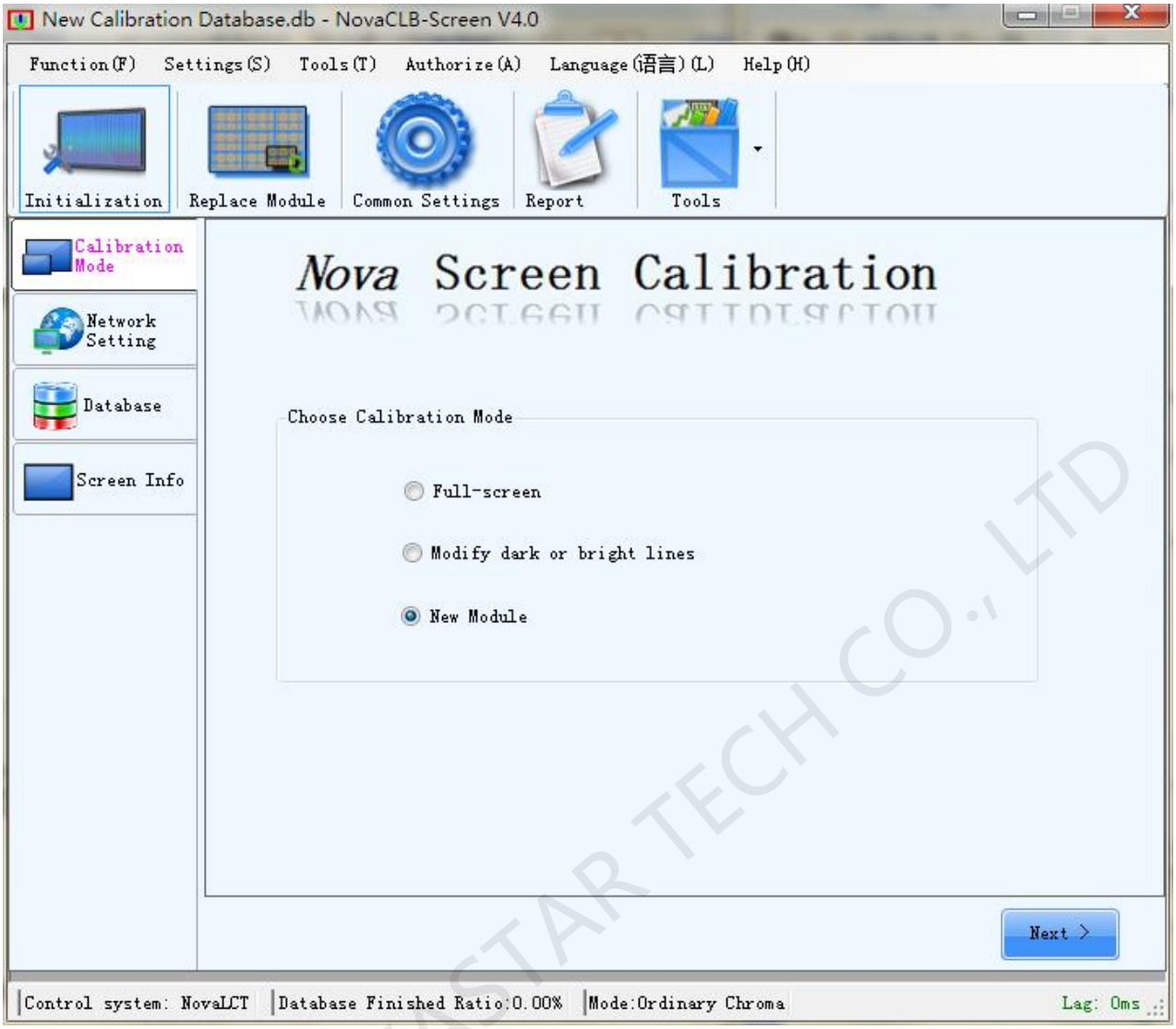


Fig. 5-1 Choose Calibration mode

5.1.1 Network setting

1) Connect to Control system (LCT or Pro) for online calibration

Open the page frame of screen calibration on NovaLCT, then conduct network setting on NovaCLB-Screen, where the IP and port are the same with Control system (NovalLCT or NovaPro), and after completing, click "Connect".

After connecting successfully, NovaCLB-Screen automatically acquires the screen number and pixels, and the number of the screen to be calibrated shall be selected.

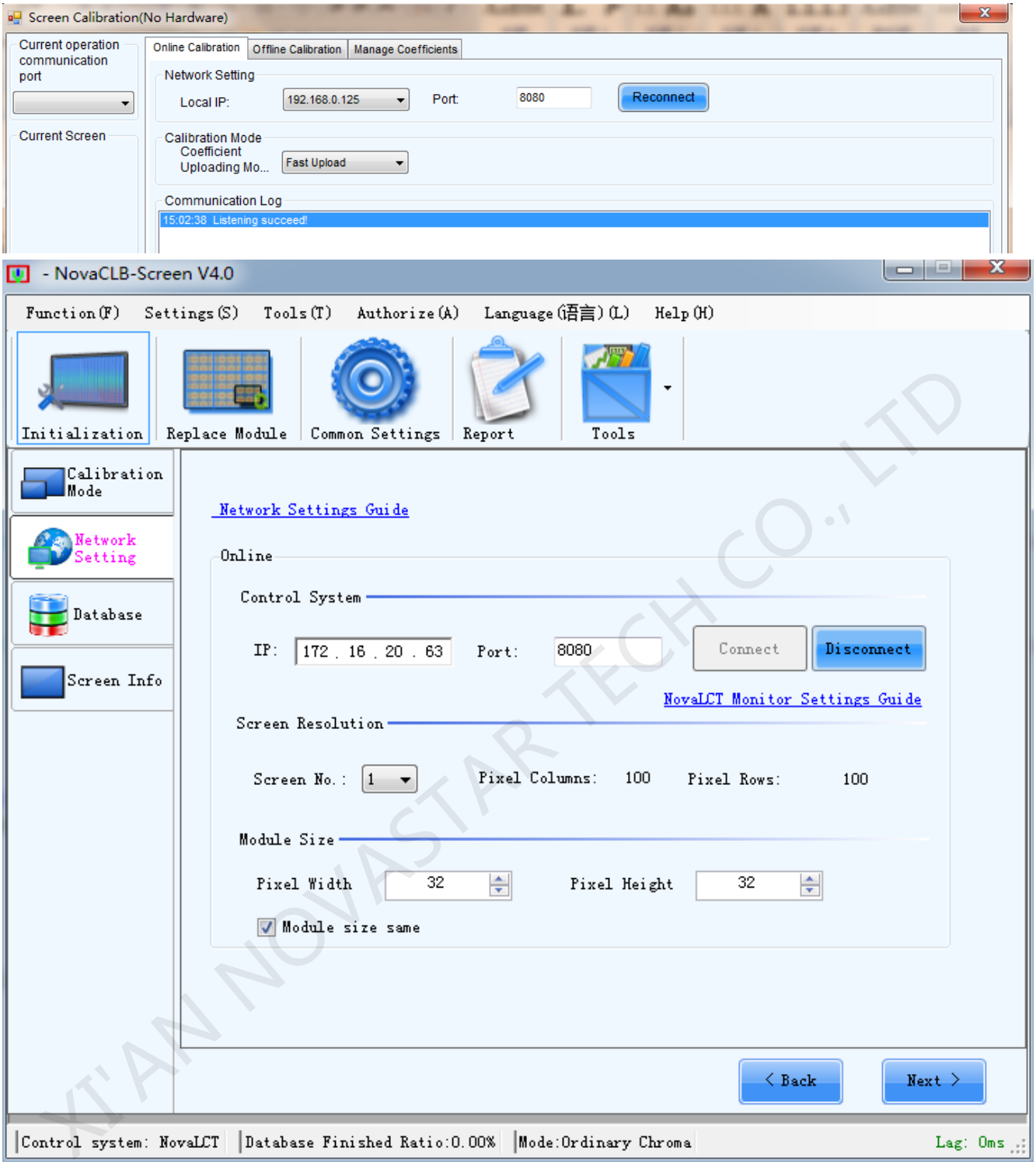


Fig. 5-2 Network setting(on-line mode)

2) Off-line mode

Correction process of Off-line mode is basically same with the mode of connection to LCT, pay attention to the difference of the interface

Tick "Off-line mode", and click "Next".

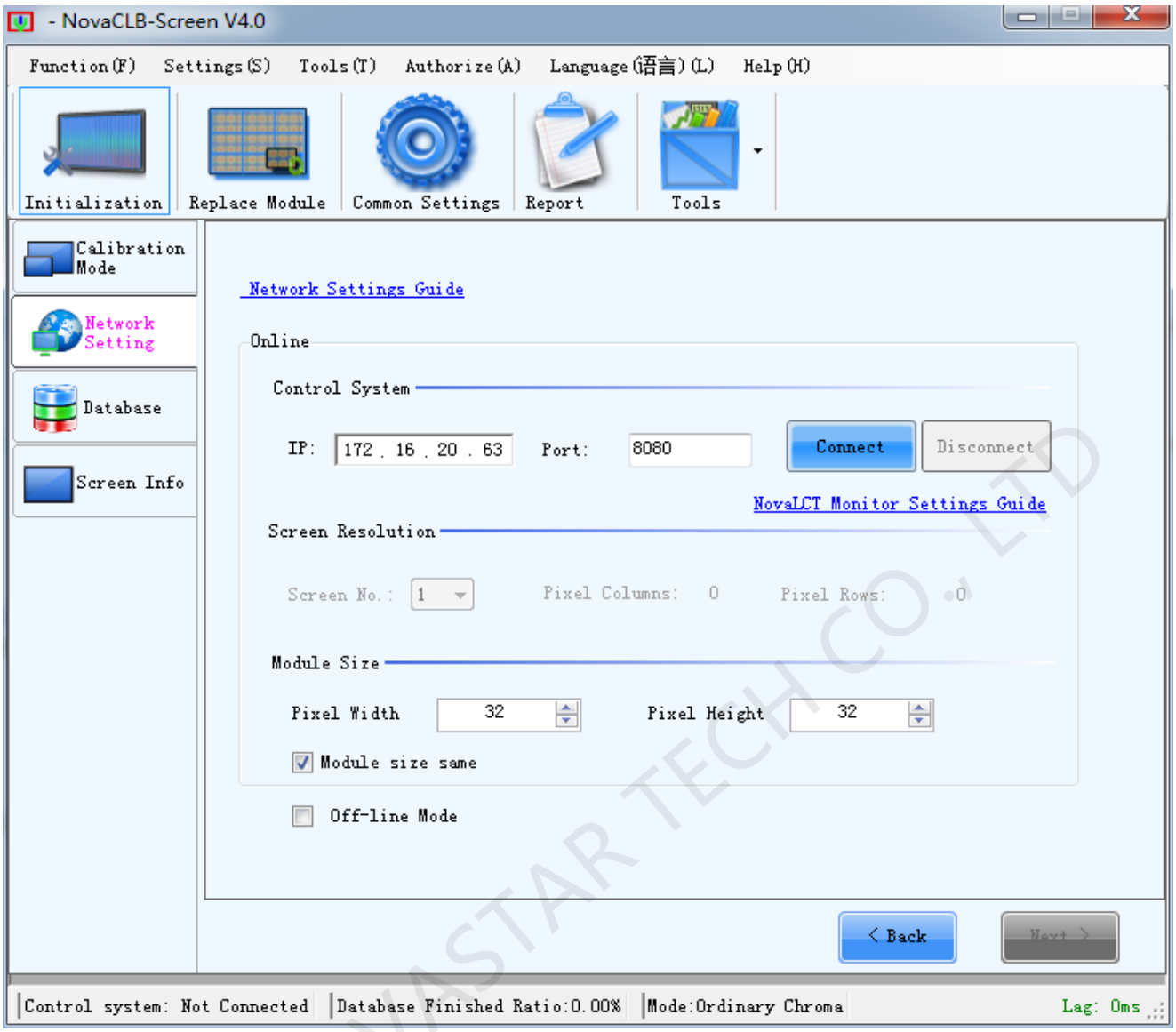


Fig. 5-3 Network setting(off-line mode)

5.1.2 Database

New database or the existing database can be used, and the database is for saving the calibration coefficient of the screen.

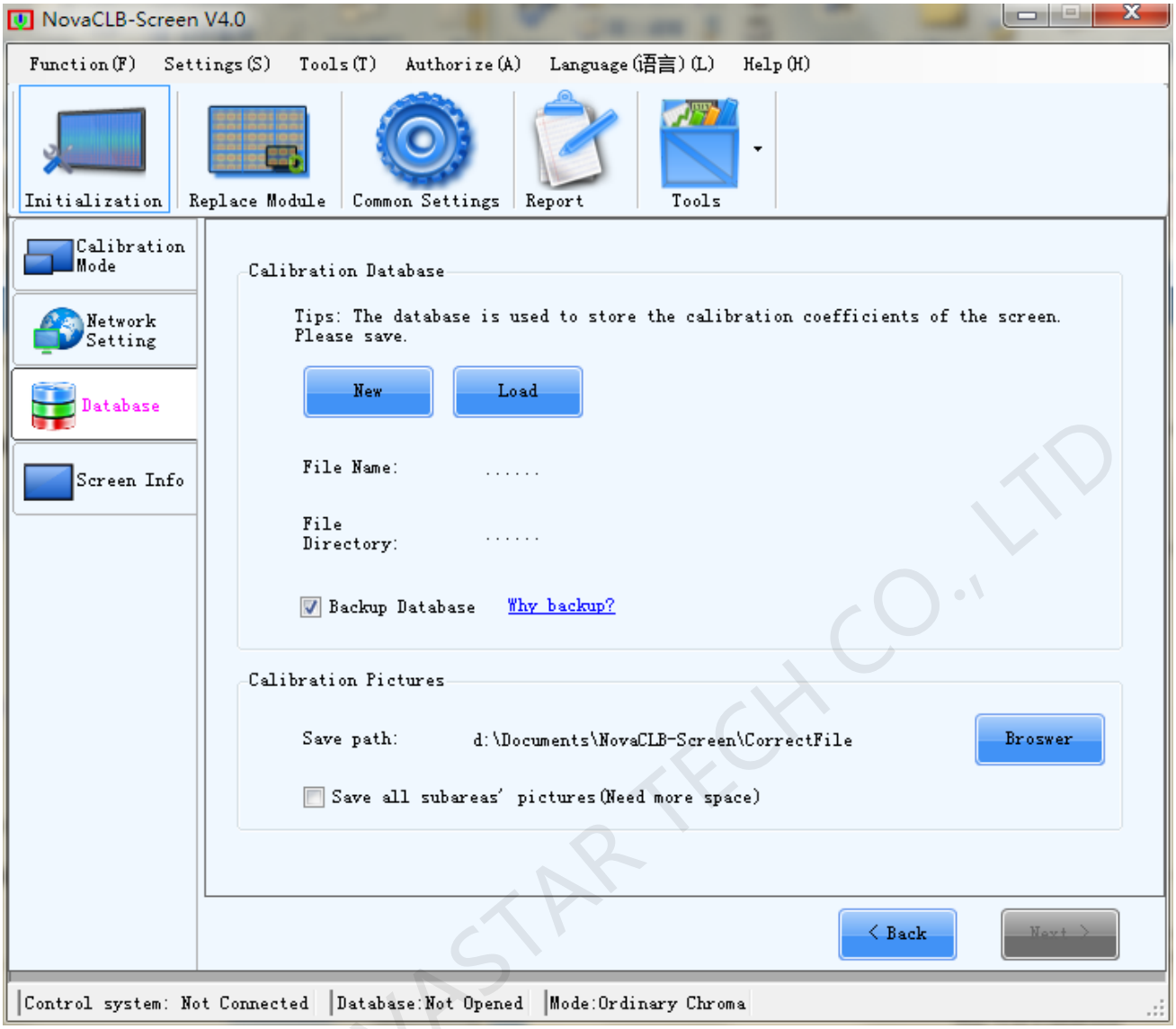


Fig. 5-4 Database

5.1.3 Screen Info

Fill the screen information based on actual situation, refer to 3.2.4 Screen Information in the Chapter of full-screen calibration for details. Click "Next" after completion to enter the subpage of "Module position" in "Module replacement".

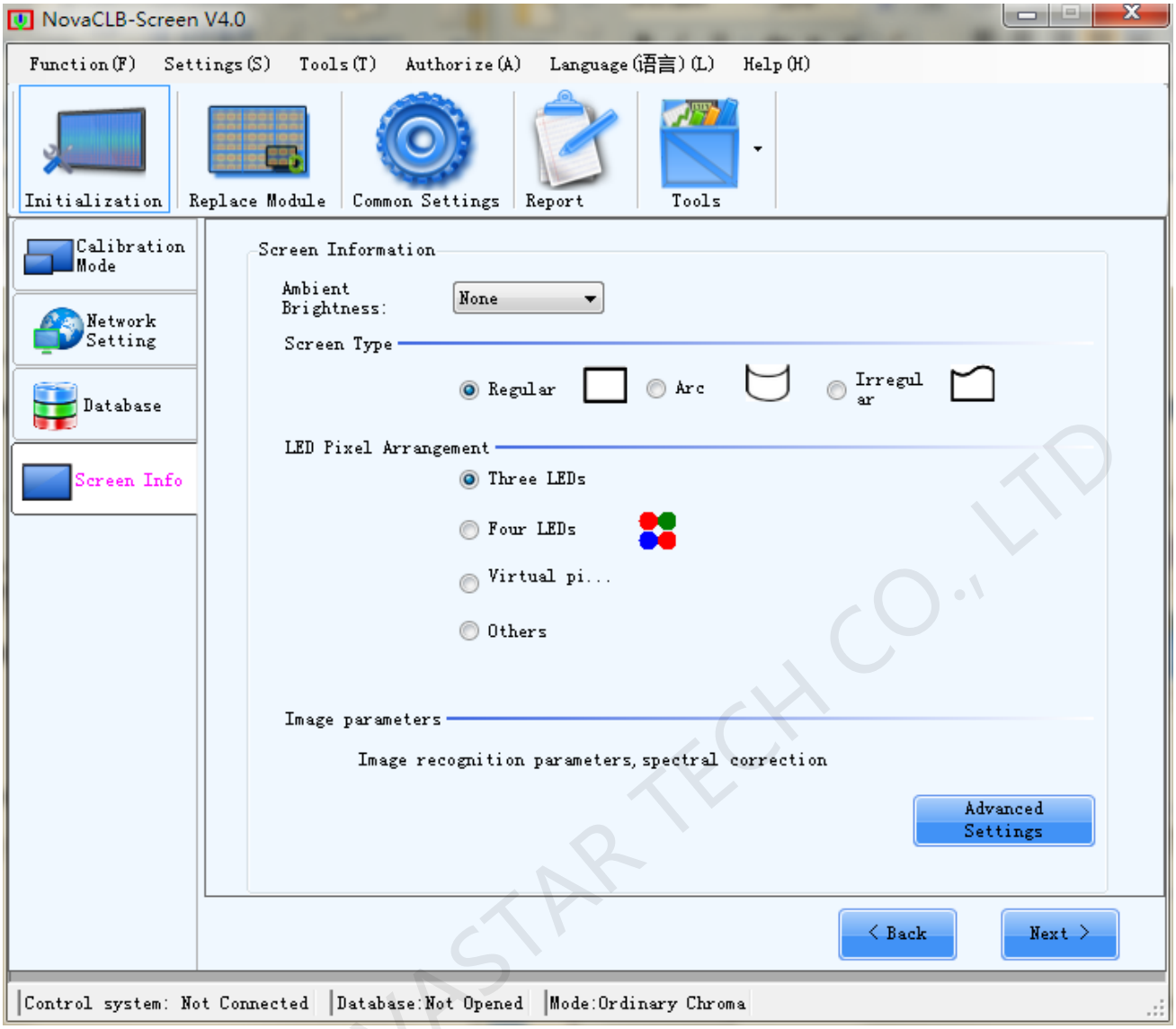


Fig. 5-5 Screen information

5.2 Replace Module

Procedures for module replacement is: module Location → camera connection → camera parameters → module calibration.

For these procedures, the procedures of online calibration connected with LCT and off-line mode have some differences in module position and module calibration.

5.2.1 Module location

The position of the new module shall be located accurately so as to perform accurate calibration

for the new module.

5.2.1.1 Online calibration（Connect to LCT or Pro）

1) Manual setting

If the calibration personnel knows clearly about the coordinate position of the new module, manual setting can be used to quickly set the coordinate and the module size, and click "Next" to connect to the camera.

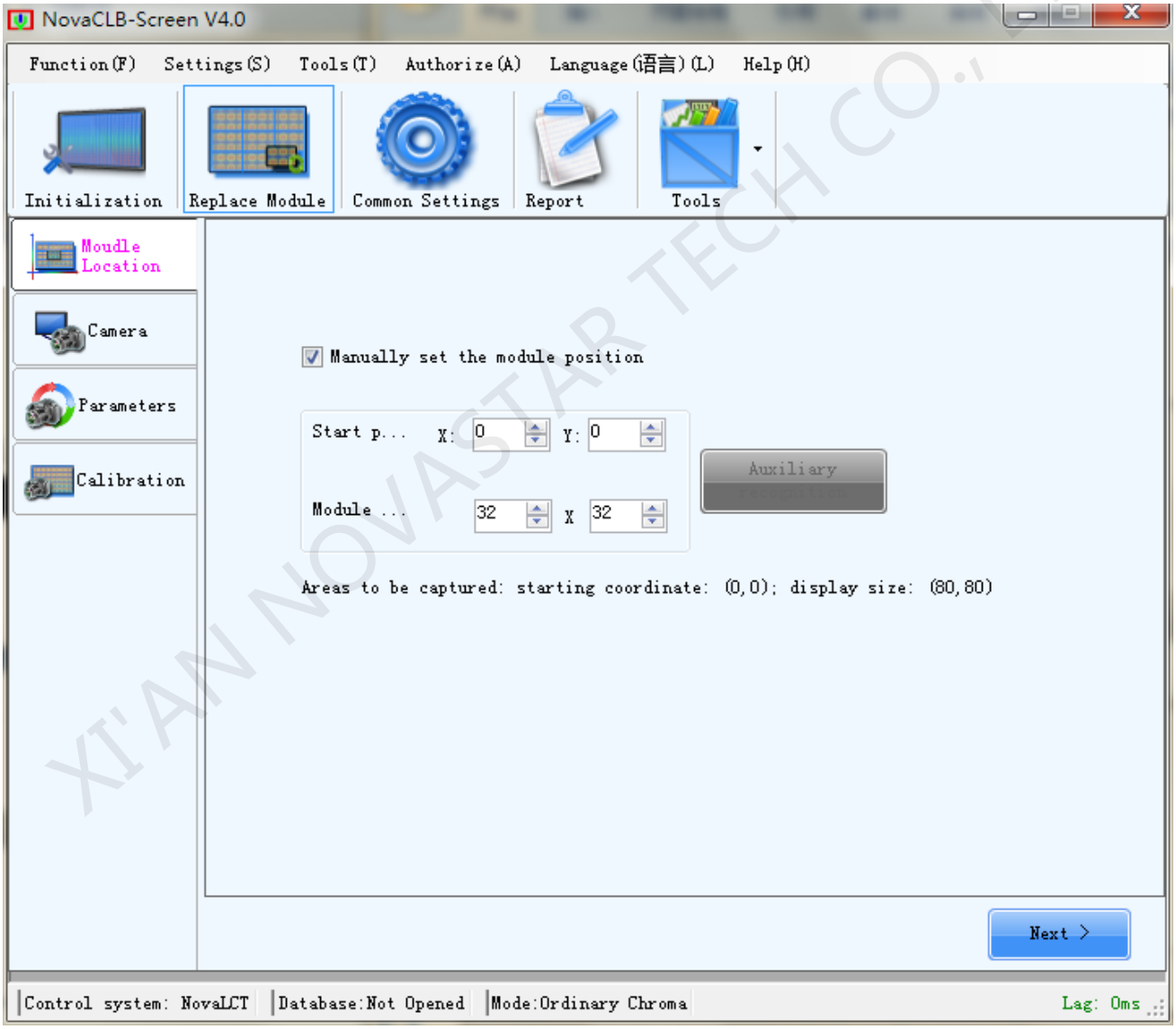


Fig. 5-6 Manually set the module position

2) Auxiliary recognition

If the position of the new module cannot be located accurately, click "Auxiliary recognition"; and the following steps are as follows:

NovaPro does not support Auxiliary recognition, please check "Manually set the module position" to input the start position and size of Module.

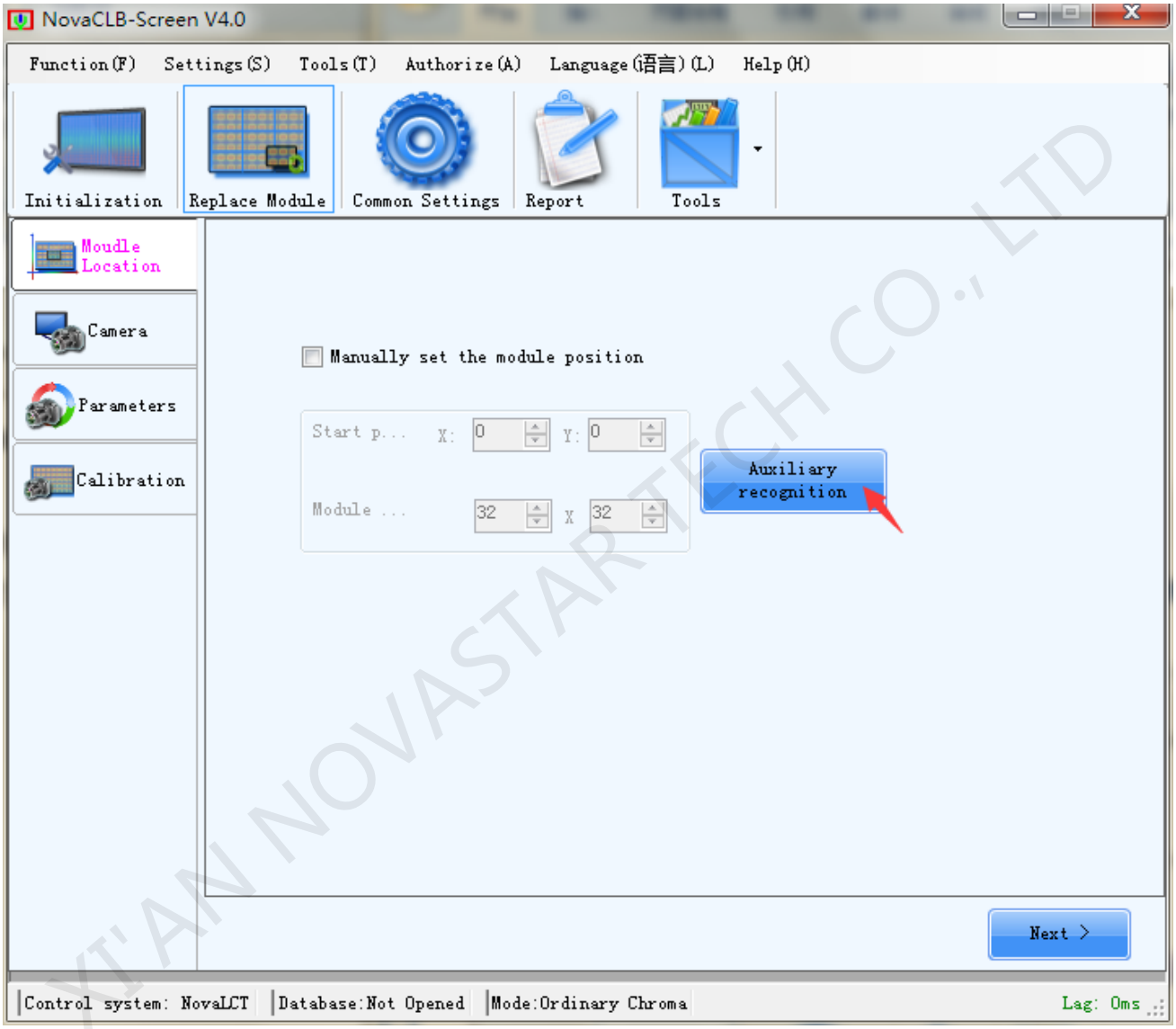


Fig. 5-7 Auxiliary recognition

a) Set the module size, click "Next", and it can be seen that the screen is divided into multiple partitions with numbers (the software defaults to conduct partition as every partition has 4×4 modules).

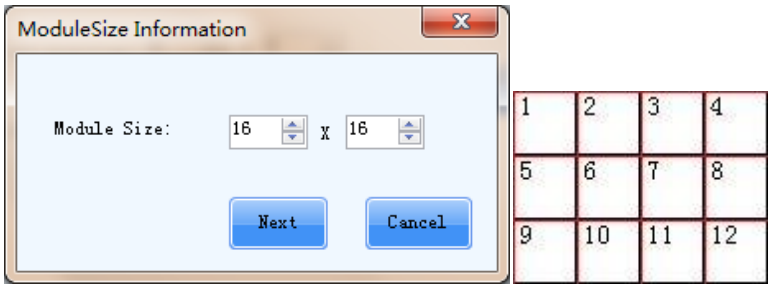


Fig. 5-8 Module Size information

b) Select number of the area where the new module is, then click "Next", and the screen displays the partition separately as well as the module number.

User can click "Reset the area size" to reset the amount of the module in every area, as shown in the following figure; after setting, click "Reposition", and click "OK", and the screen will display the area division after repositioning.

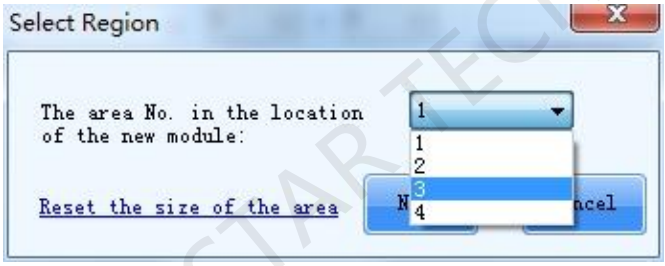


Fig. 5-9 Select Region

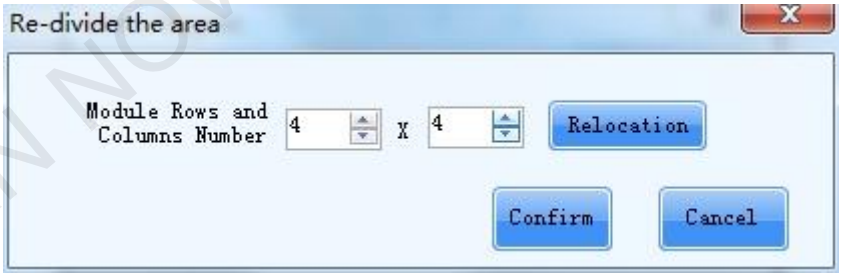


Fig. 5-10 Re-divide the area

Confirm the number of the new module, and click "OK".

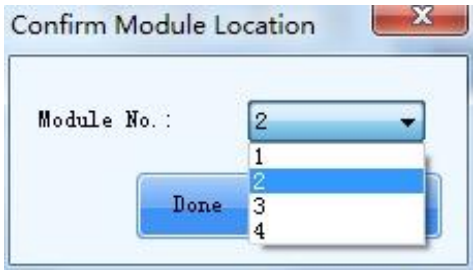


Fig. 5-11 Confirm Module location

5.2.1.2 Offline Calibration

Set pixel columns and rows of the screen, starting coordinate of the new module, and module size.

Click "Next".

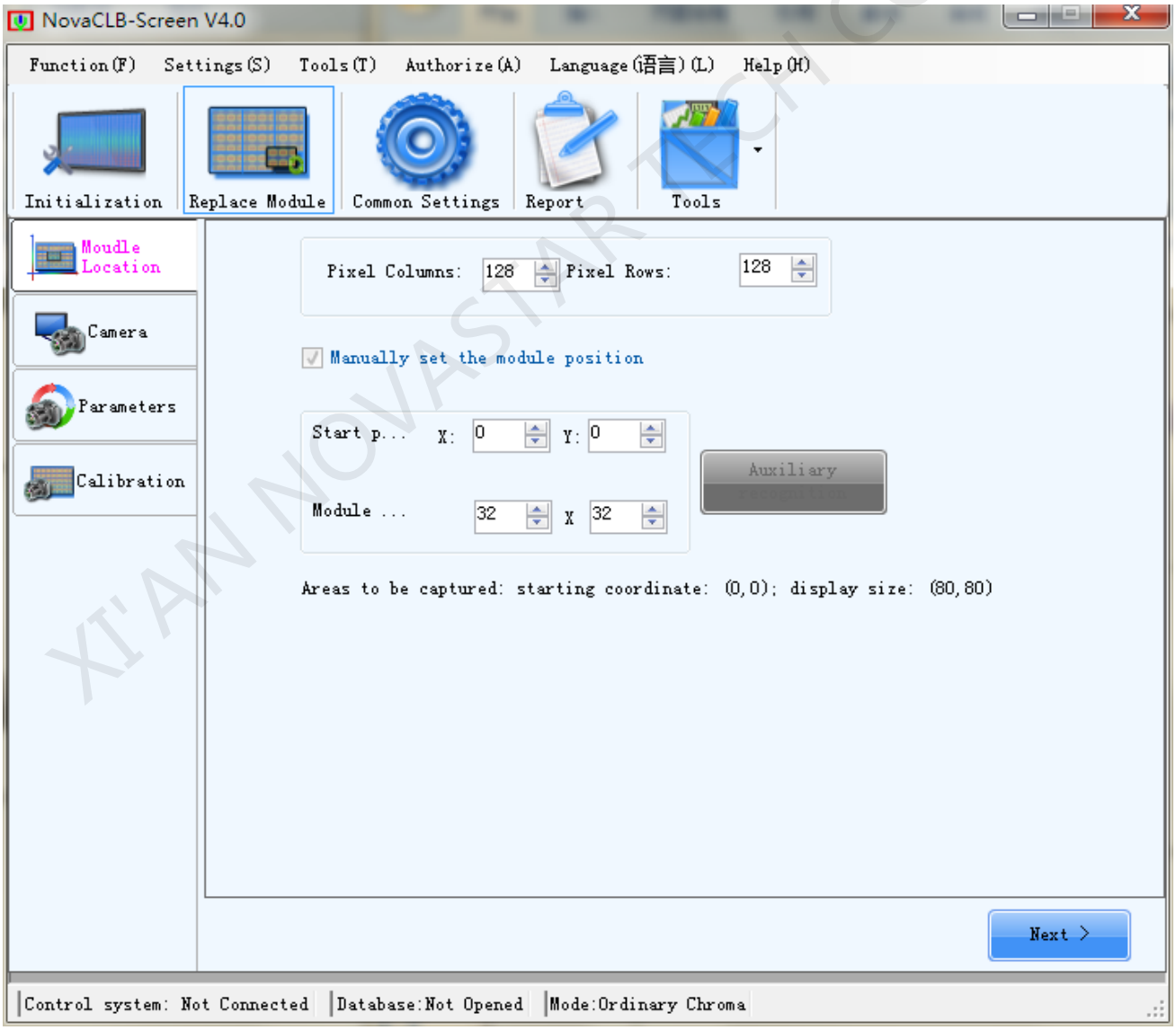


Fig. 5-12 Module location(off-line)

5.2.2 Connect to Camera

During calibration, the camera must be connected to the calibration computer normally, kept as aligning to partition and can photograph normally. If the camera is connected successfully, the state of the camera is shown as follows, click "Next" to enter camera setting.

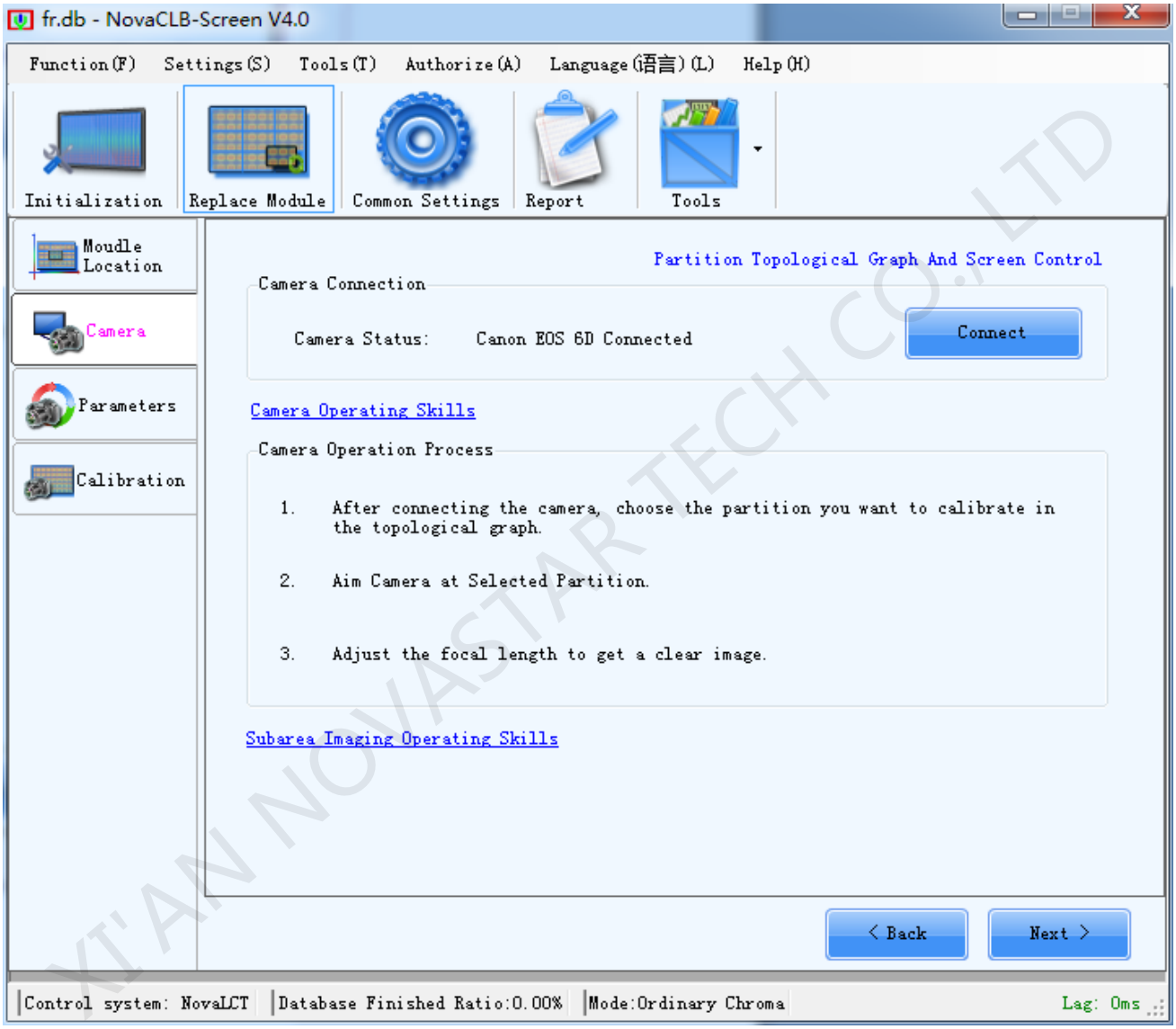


Fig. 5-13 Connect to Camera

5.2.3 Camera Parameters

No matter manual or automatic adjustment is used, adjust the saturation of the camera to be normal, refer to 3.3.3 Camera parameters.

After completing setting, click "Next".

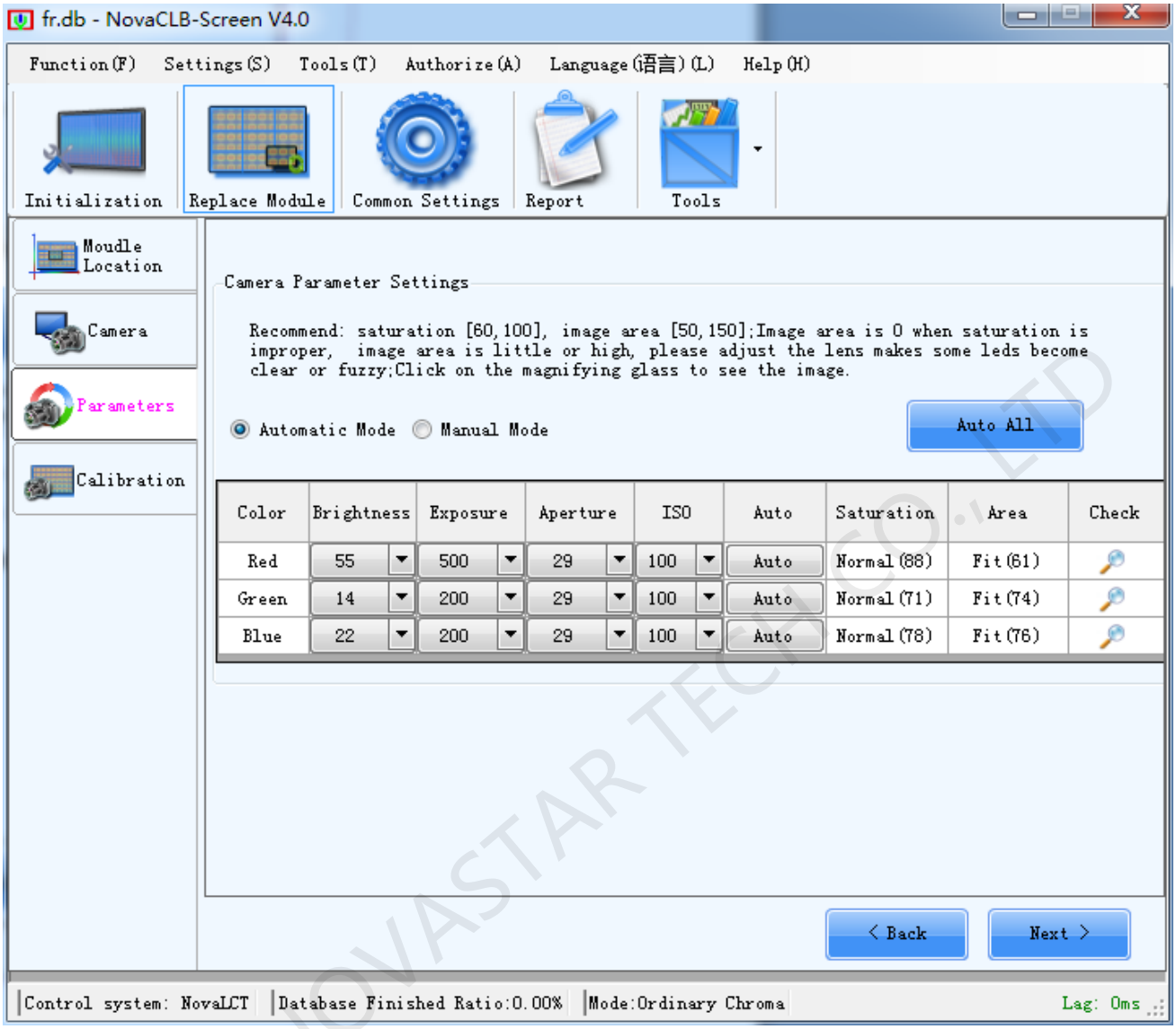


Fig. 5-14 Camera Parameter Settings

5.2.4 Module calibration

5.2.4.1 Online calibration （Connect to LCT or Pro）

The software defaults to tick "Automatic mode" and click "Enable automatic calibration", and the software will finish the calibration to the module automatically.

User can cancel ticking "Automatic mode", and manually complete the module calibration according to the calibration procedures on the right.

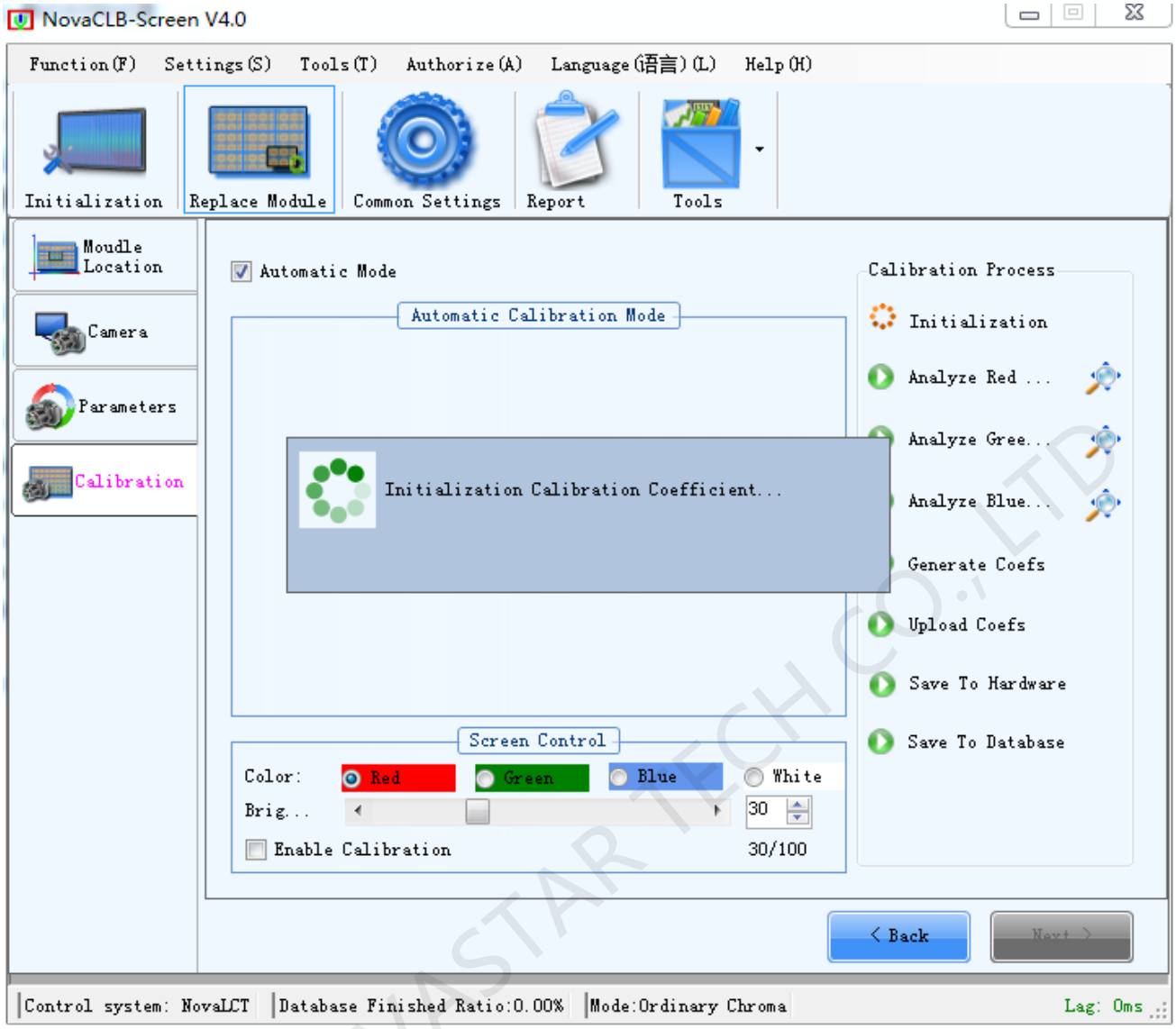
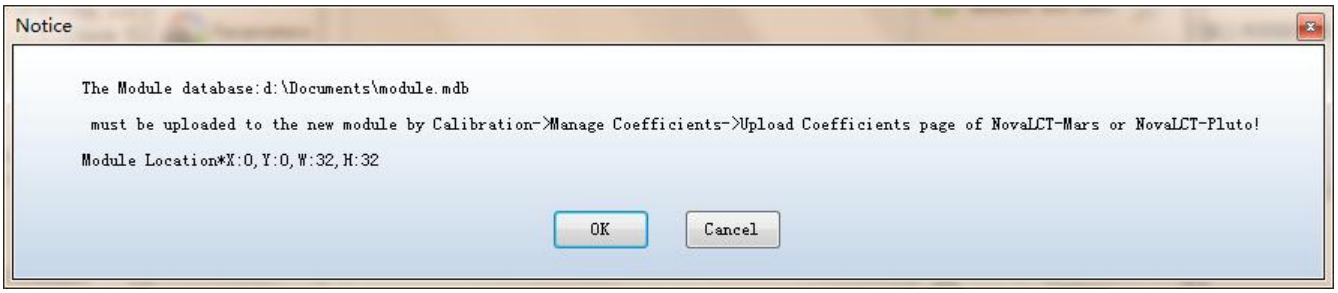


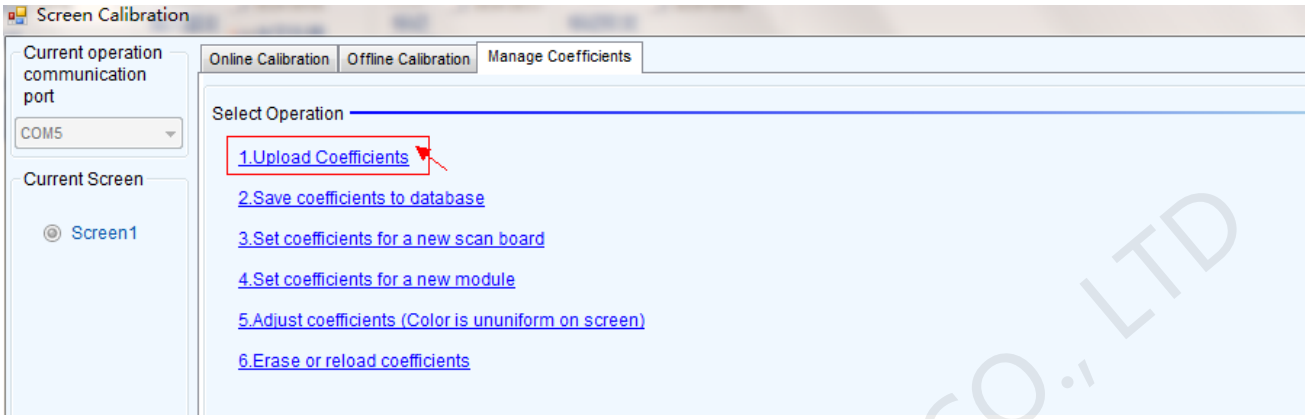
Fig. 5-15 Module calibration (online calibration)

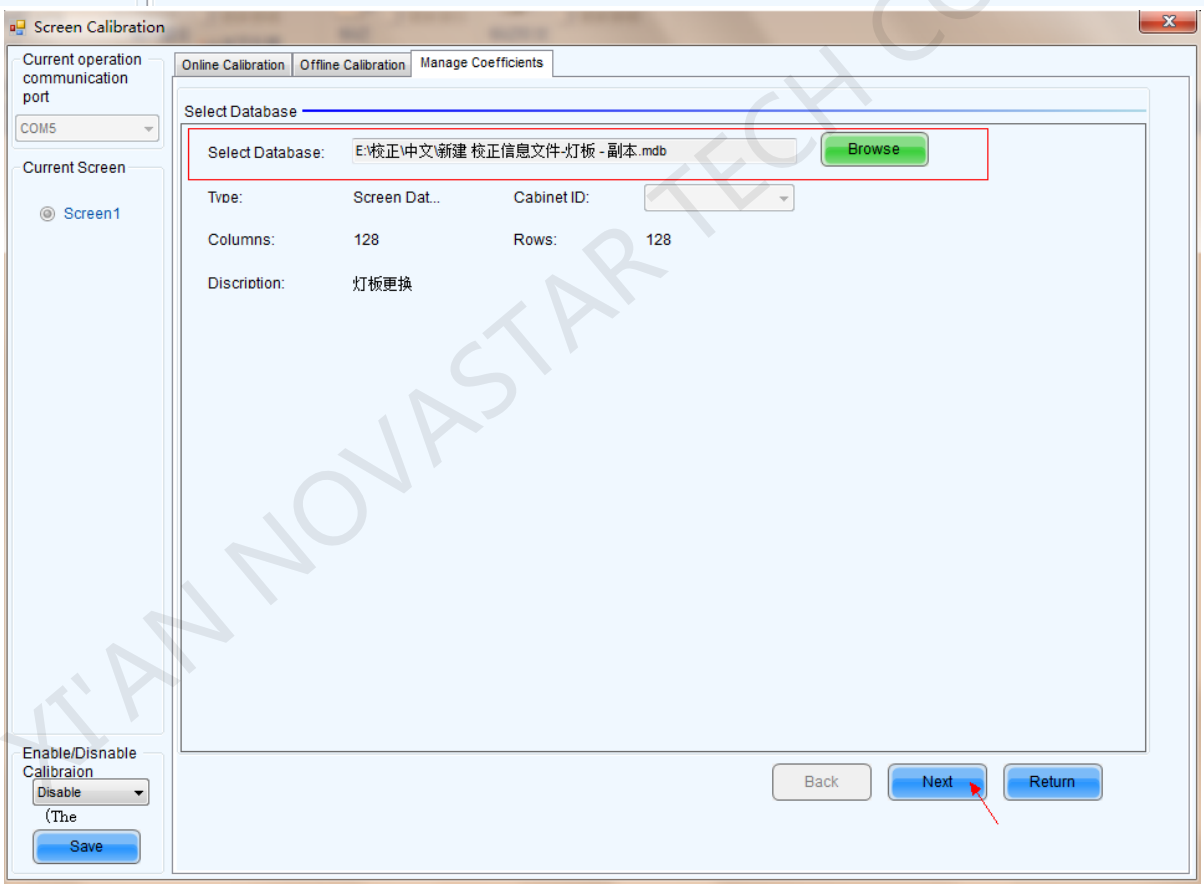
5.2.4.2 Off-line mode

When you start calibration under the offline mode, some dialog would be shown. Please read the tips on them carefully, and follow the tips to do certain operation, or the offline calibration cannot finish successfully.

1) Upload the module database to the new module







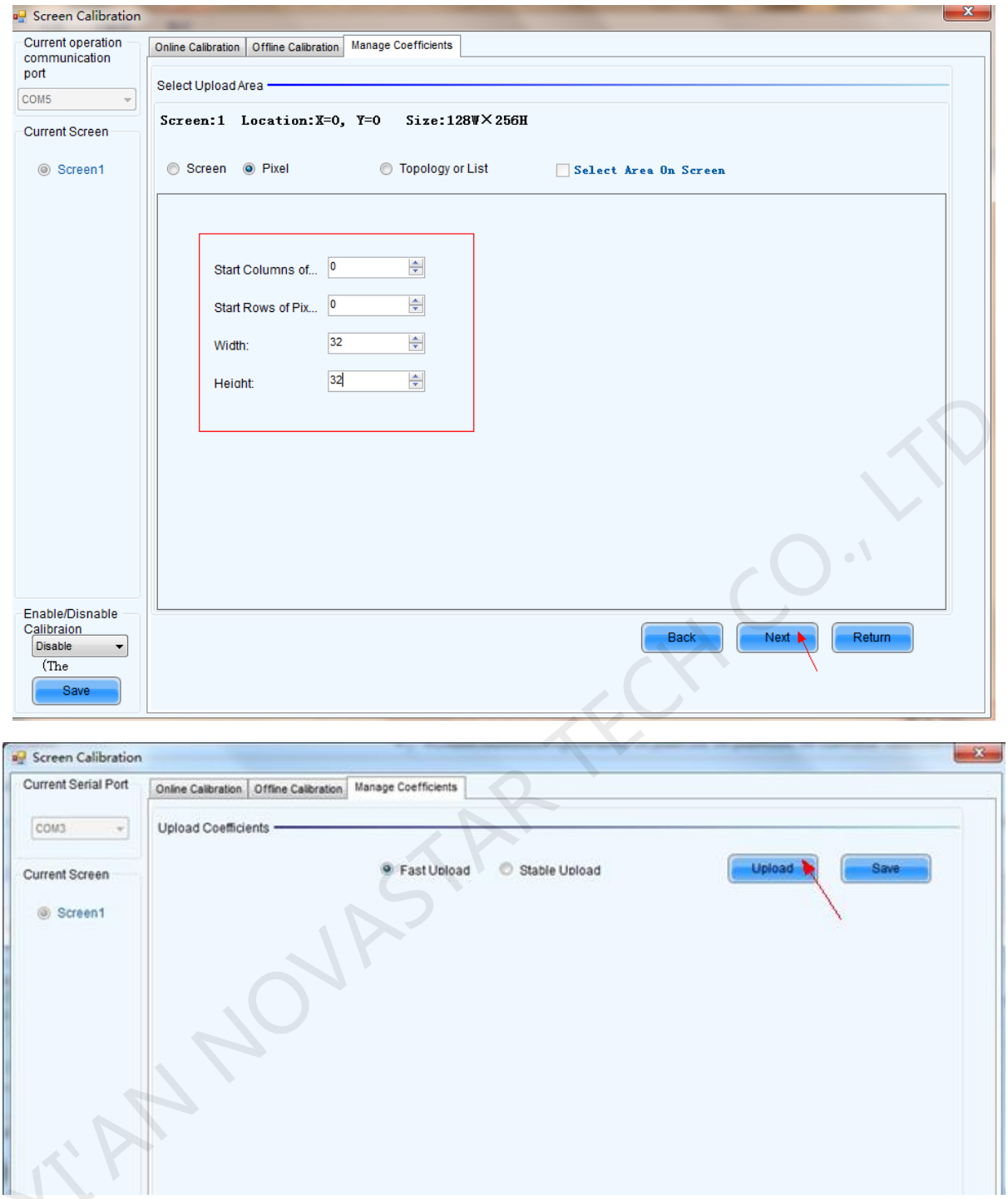


Fig.5-16 Offline calibration-Upload the module coefficient

2) Make sure the coefficients have been uploaded to new module, and then click ‘OK’.

Fig.5-17 Make sure the coefficients in the database

3) Get the average coefficient of calibration area on offline calibration interface of LCT and input them.

Respectively fill the coordinate, width and height (X, Y, W and H) of the new module area and the collecting area of the Fig. 5-18 into the display area of Fig. 5-19, and then click "Get average coefficient" to get the average coefficients of the new module area and the area to be collected.

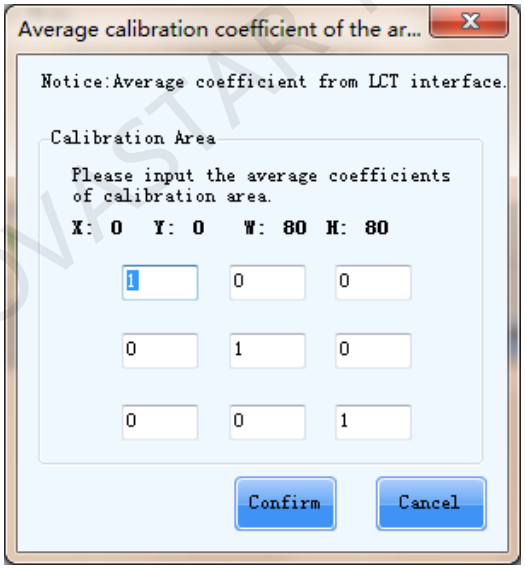


Fig.5-18 Average calibration coefficient of the area

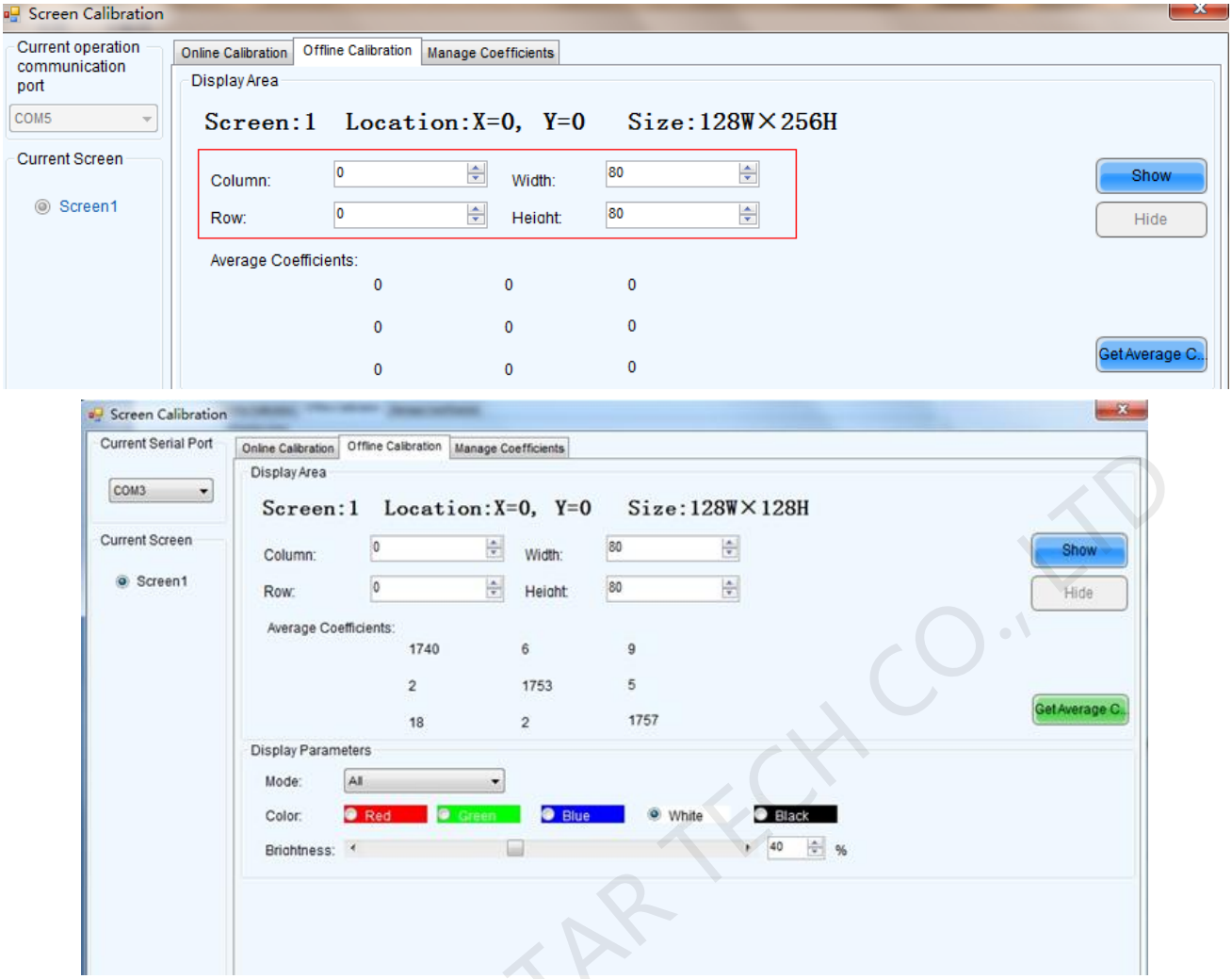


Fig.5-19 Offline-Get Average coefficient

4) Input the average coefficient of the collecting area at the average coefficient to be calibrated window of NovaCLB-Screen (as shown in Fig. 5-18).

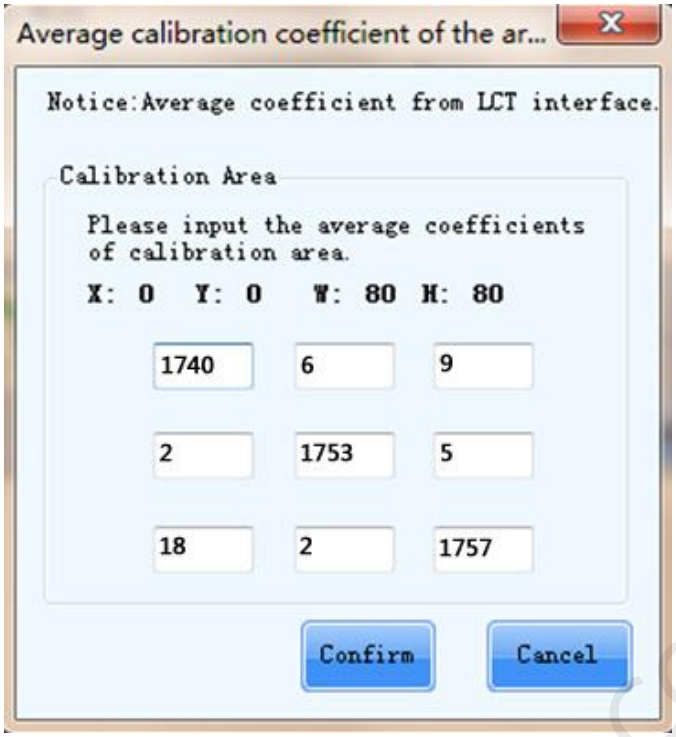
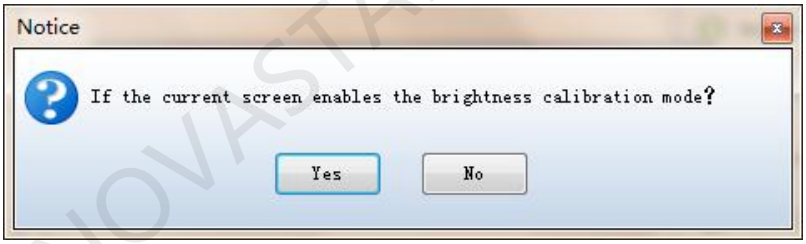


Fig.5-20 Input average calibration coefficient

5) Check if the brightness calibration is enabled on the offline calibration interface of LCT, if it is not, please enable it.



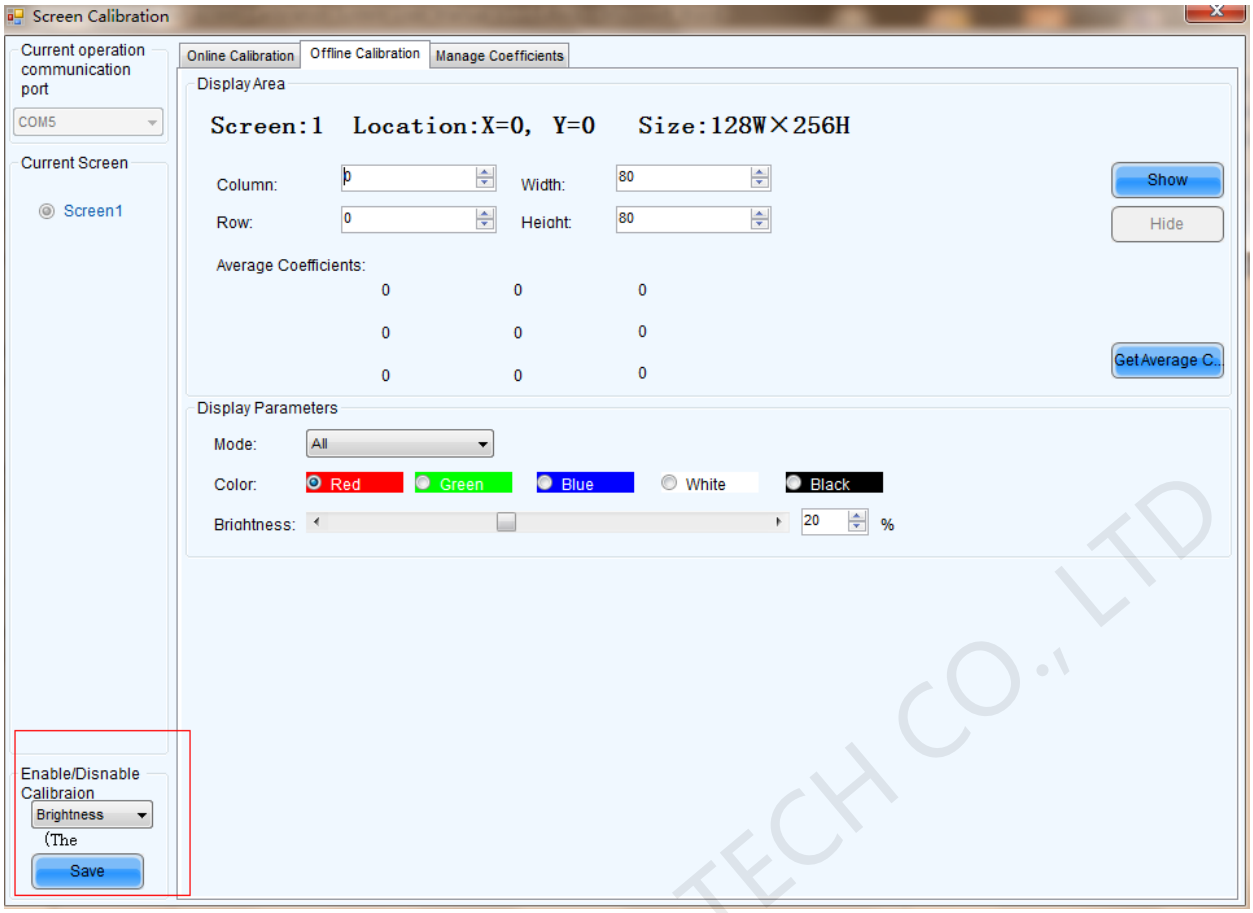
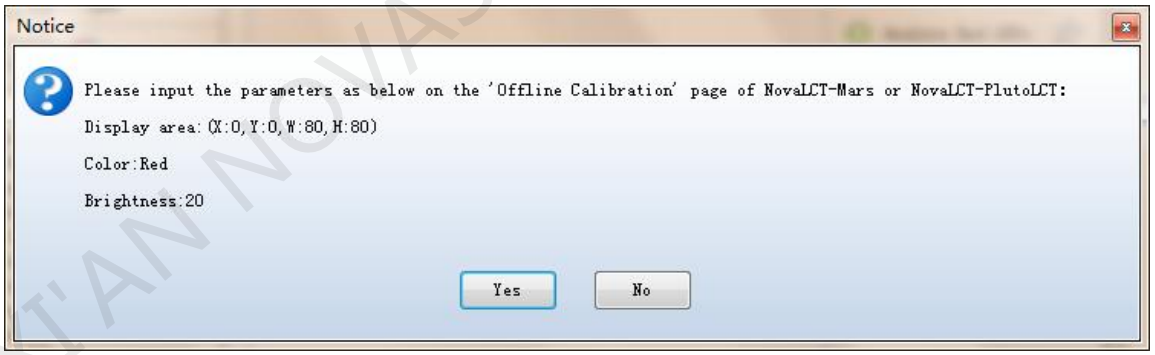


Fig.5-21 Enable brightness calibration

6) Set display parameters for offline calibration on NovaLCT.



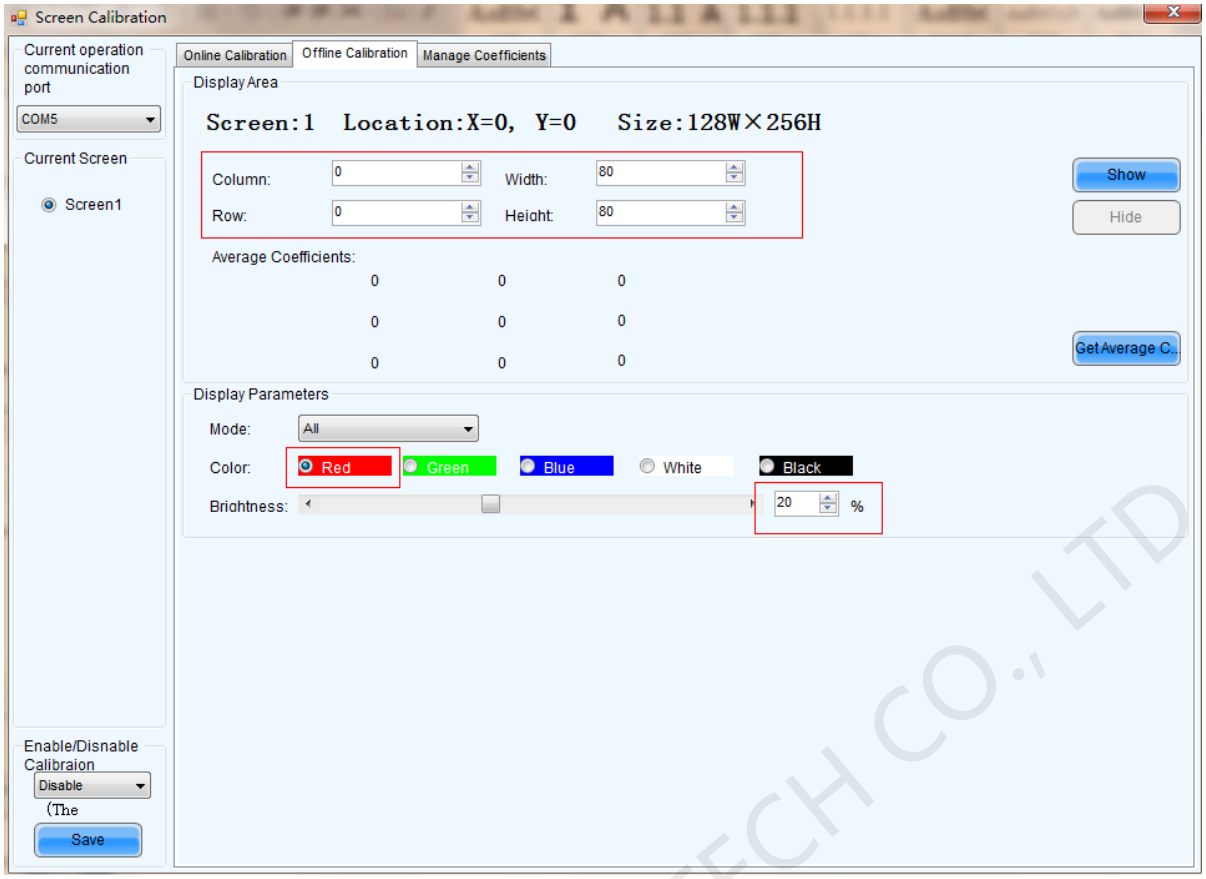


Fig. 5-22 Set display parameters in offline calibrationmode

7) After completing setting, click "OK" to enable calibration, where the calibration procedure is the same as the online mode.

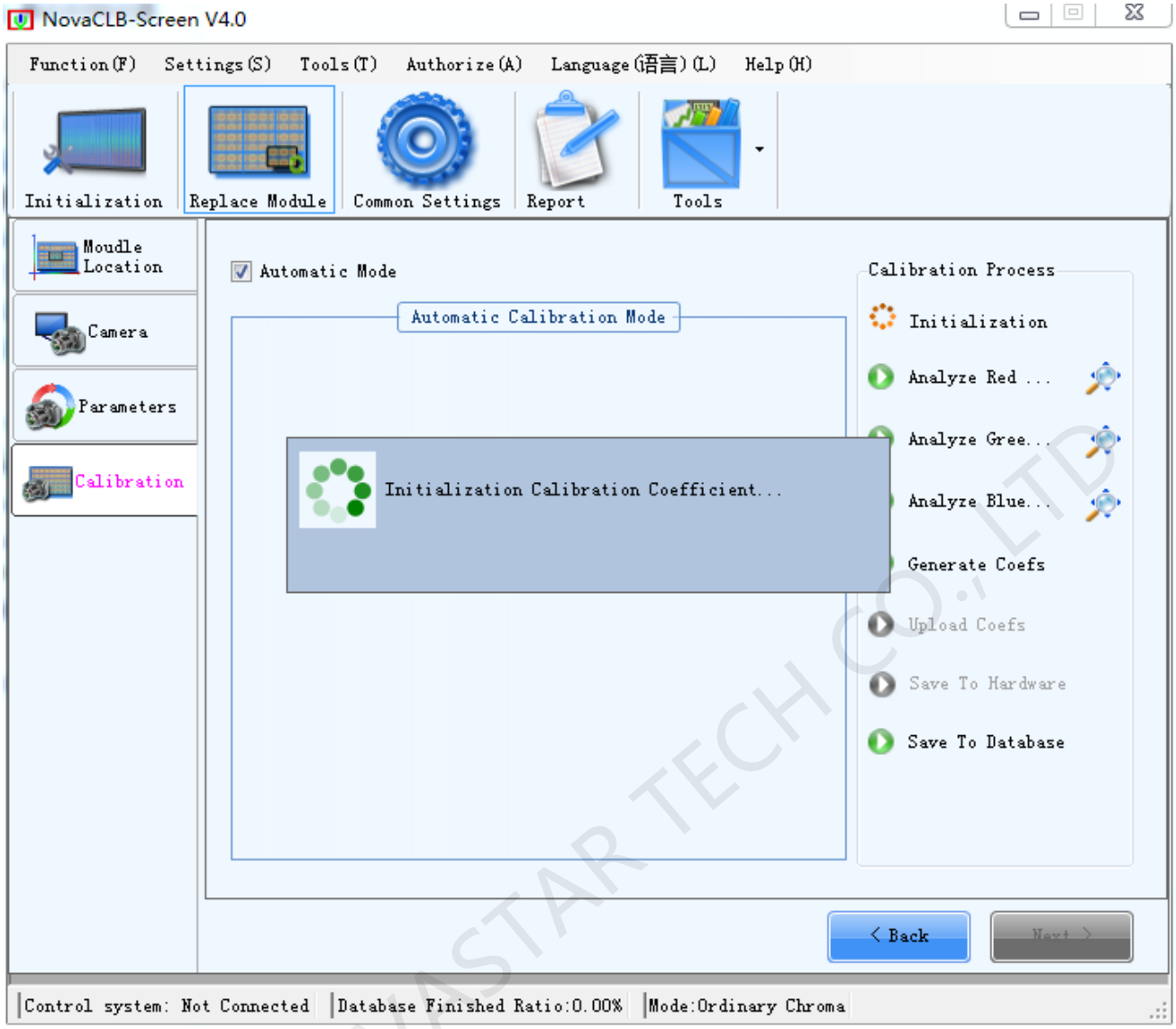


Fig. 5-23 Module calibration（off-line)

6 Calibration interruption (Searching LED position failed)

No matter full-screen calibration or module calibration, after the calibration is enabled, various of problems at the site may cause led position failed leading to calibration interruption, such as screen binding, Dead LED or interference light. Generally, artificial location is adopted to help solve these problems, and this section will introduce solutions for several common situation.

1) Normal binding

Normal binding means that the whole columns or rows at the edge of the screen is wrapped regularly, and the error of search appears as not enough detected columns and rows, as shown in the following figure:

Solution:

a) Tick "Binding existed, need detection", and click "Next".

b) The software detects four sides of the screen respectively, and the software defaults "Auto switch"; user needs to pay attention to the state of the software (namely at which row or column) while observing the lights lighting up at which stage of the screen, then record which state so as to select state at the "result" and click "Next".

c) After the four sides of the screen are detected, the software continues for calibration.

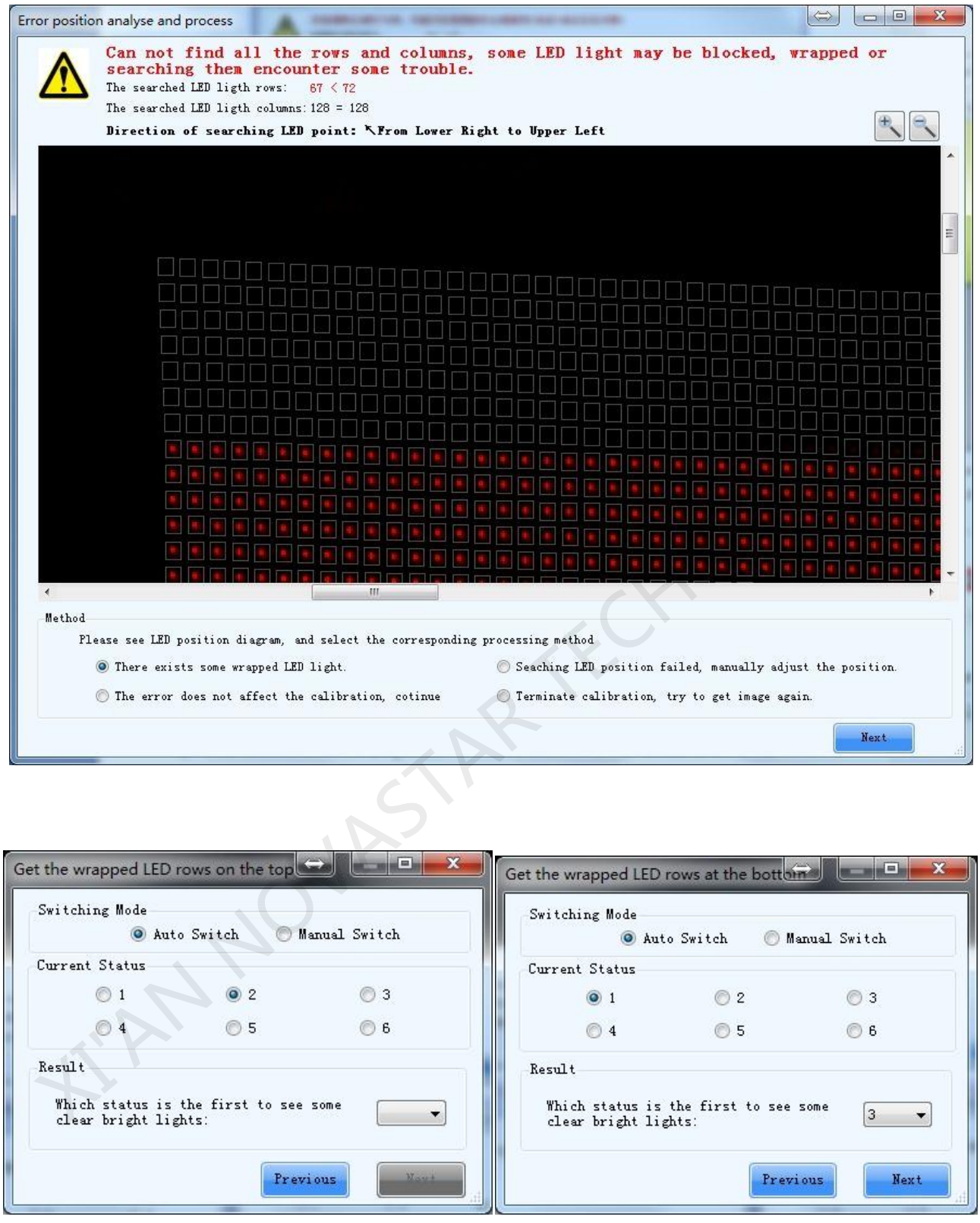


Fig. 6-1 Solution for Normal binding

2) User considers the binding to be normal, calibration can be forced to continue sometimes, user considers the binding to have little effect, then ticks "The error does not effect the

calibration, continue", then click "Next" to continue calibration.

3) Dead LED is reasonable, continue calibration

The number and location of the Dead LED detected match the actual situation, which means that the screen actually has these Dead LEDs at these positions, and this situation is called normal Dead LED.

Solution: Tick "Dead LED is reasonable, continue calibration", and click "Next" to continue calibration.

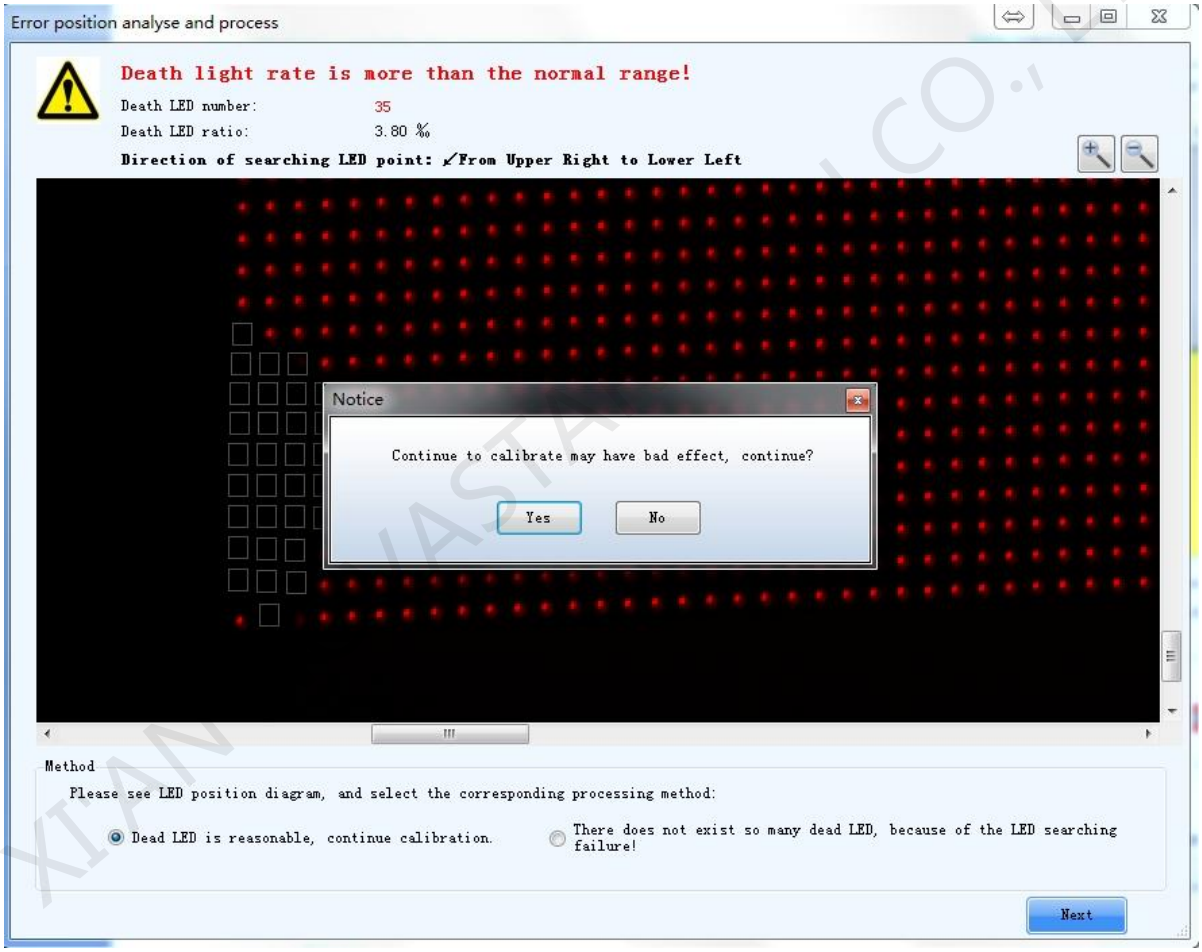


Fig. 6-2 Dead LED is reasonable

4) Dead LED increased by failure of searching

The detected Dead LEDs are most fake Dead LEDs, which means that the actual screen does not have so many Dead LEDs.

Solution:

a) Tick "There does not exist so many Dead LED because of the LED searching failure ", and click "Next";

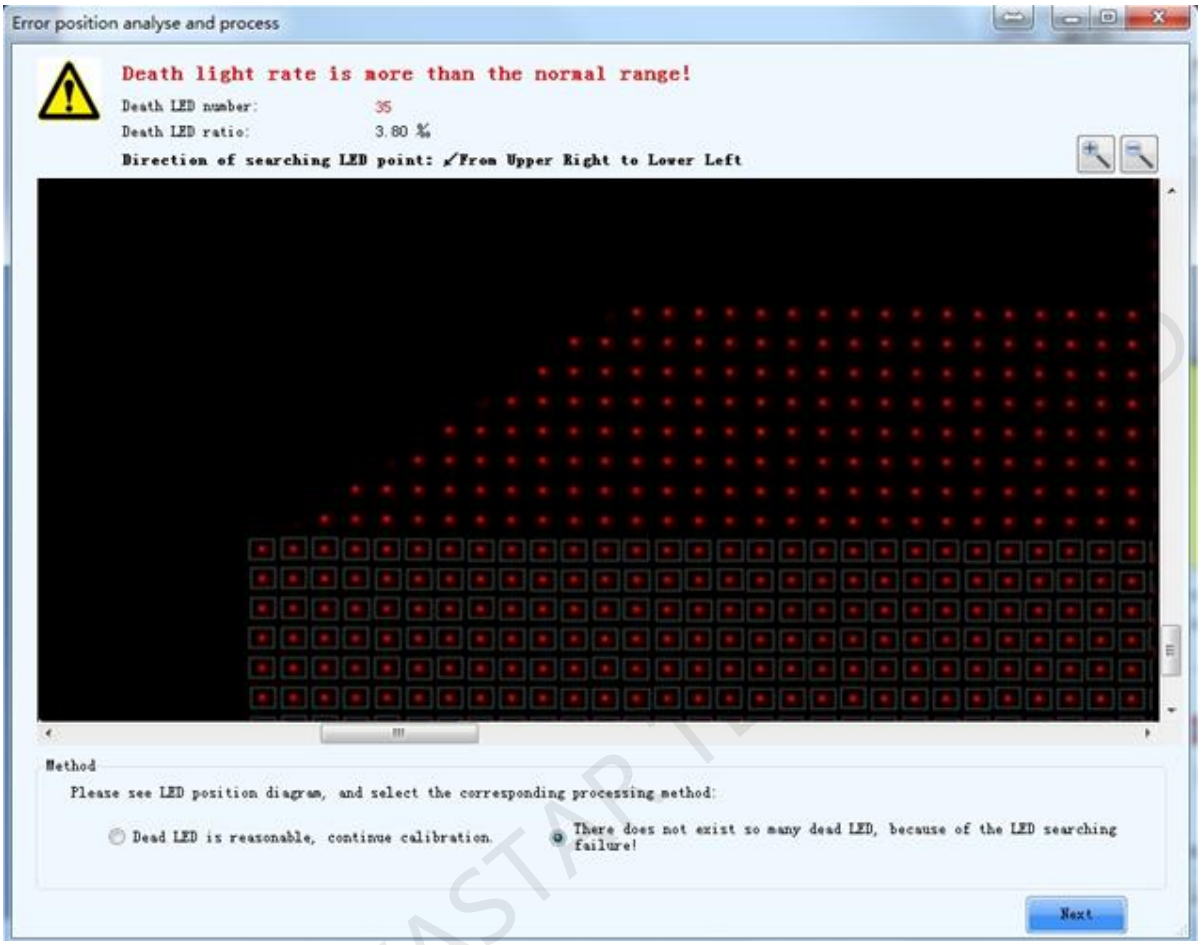


Fig. 6-3 Death light rate is more than the normal range

b) Adjust the first wrong LED point on the searching direction to right position, then click "search again".

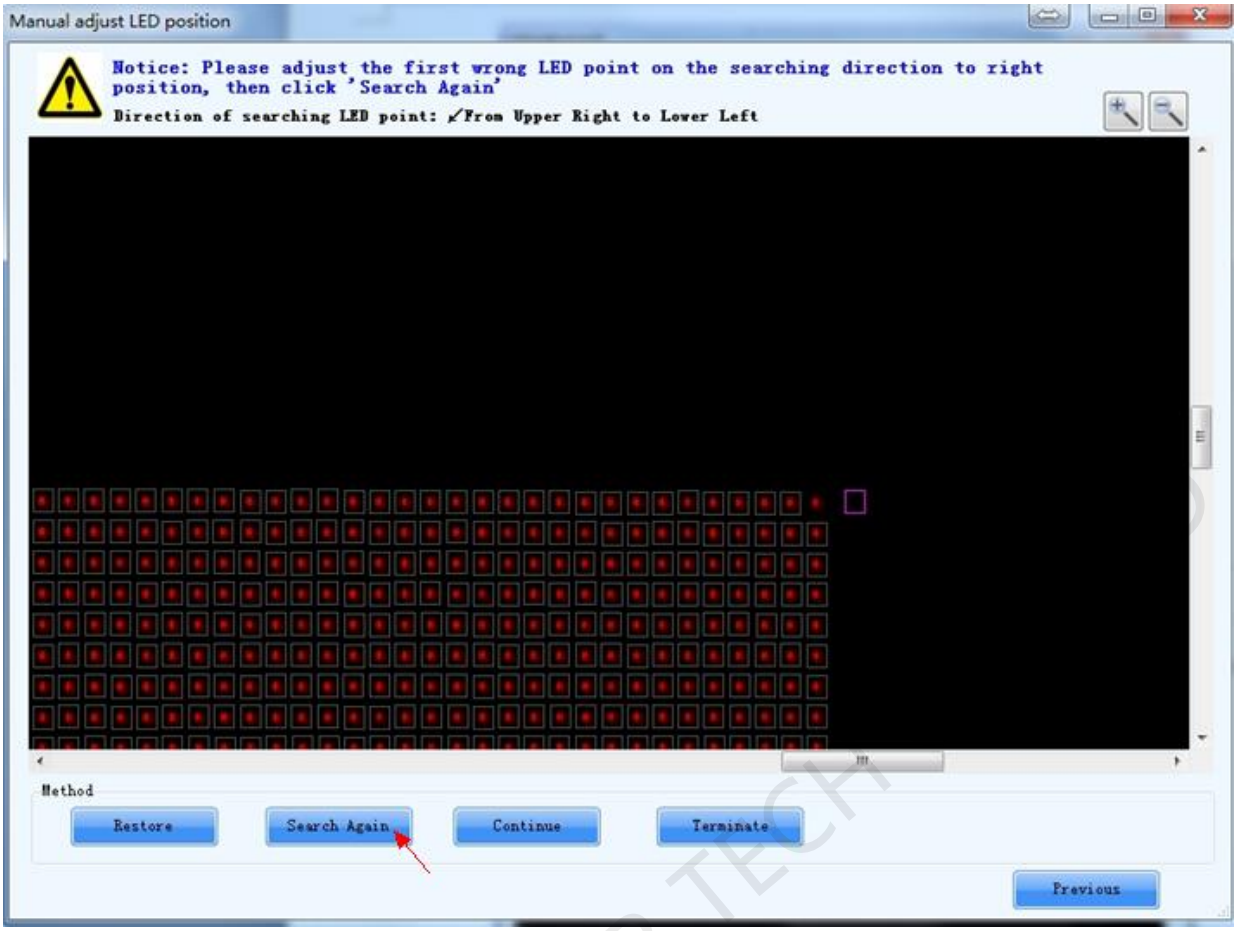


Fig. 6-4 Search Again

Restore: Restore to the state of the last search;

Search again: Conduct search again according to the current location direction and initial point;

c) After the searching is successful, continue calibration.

5) Dead LED at the location initial position causes searching inconsistent rows and columns

If the location initial point has Dead LEDs, part of the lights may be bypassed during location monitoring, which will cause inconsistence between detected rows and columns and the actual situation.

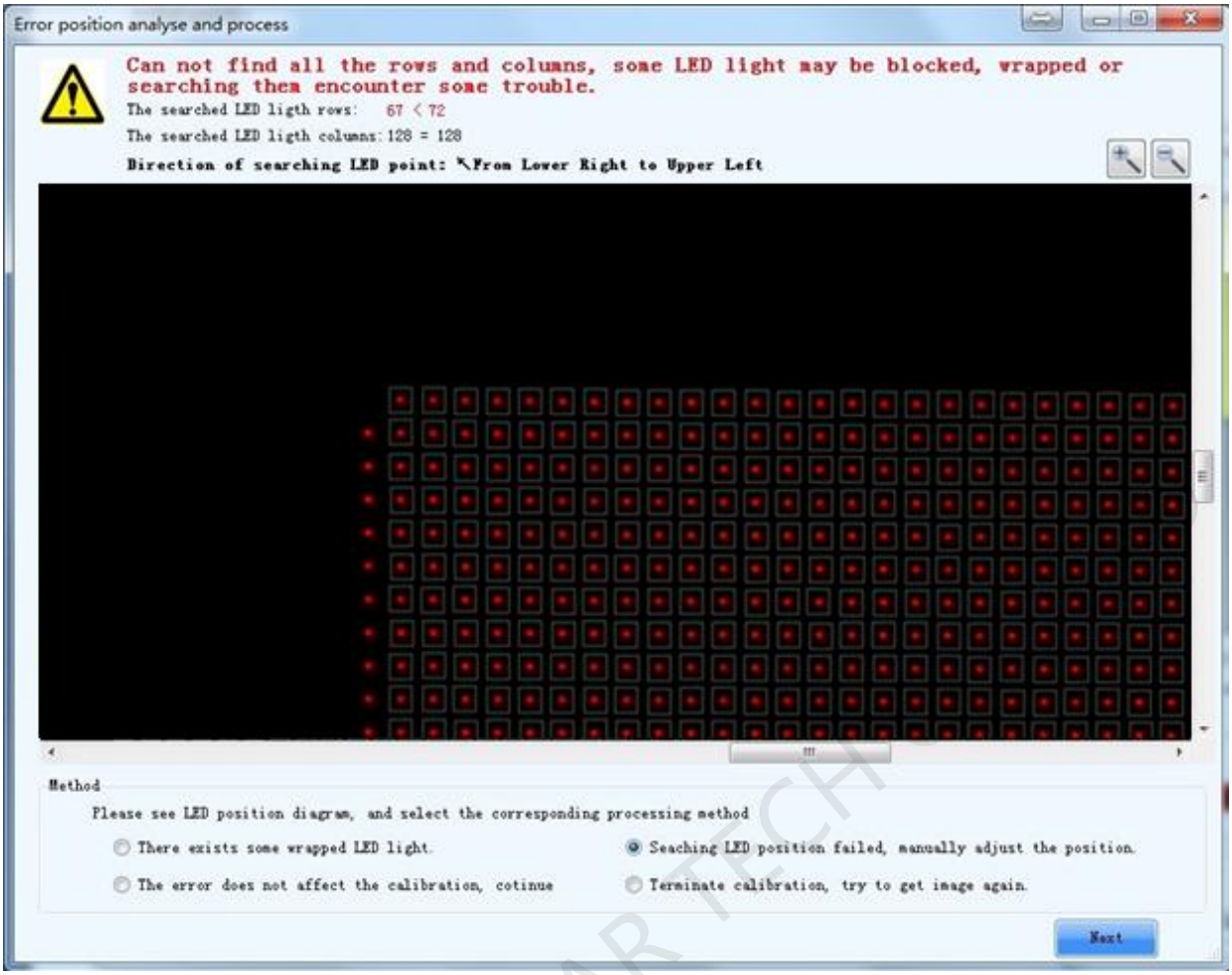


Fig. 6-5 Dead LED at the location initial position

Solution: Tick "Searching LED position failed, manually adjust the position", and re-select the location direction, switch to a start direction without Dead LED so as to conduct search again.

6) Search result differs a lot with actual situations, calibration abandoned

If the result of search differs a lot with the actual situation, for example, Searching result is that there are Dead LEDs at the up side and down side of the screen, but actually, there are Dead LEDs at left and right sides, under this situation, it is suggested to abandon calibration.

7) The number of rows and columns increases in the detection result

The result of search failed is that the number of rows or columns is greater than actual situation.

Solution: This result is caused by two possibilities: one is interference light which is eliminated as the solution; the other is that the resolution of sending card is inconsistent with that of graphics

card, then the resolution of the sending card shall be set on LCT.

7 Full Screen Data Merging

Spot calibration often encounters such situation: a large screen is applied with multiple sending cards for loading, and a video processor and a video stitching device are used between the graphics card and the sending card to connect the frames; at this moment, the display and the large screen are not in point-to-point display, and during calibration, the video process equipment needs to be skipped, and the large screen shall be divided into multiple split screen for respective calibration; and after calibration, unsmooth transition may appear at the adjacent area of the split screens, which is commonly known as layering. The full screen date merging tool is for solving this problem.

At the main interface of the software, click "Tools" → "Full screen data merging"; after opening the tool, assume that the full screen has been divided into four regions for calibration, set 2 rows and 2 columns of split screen.

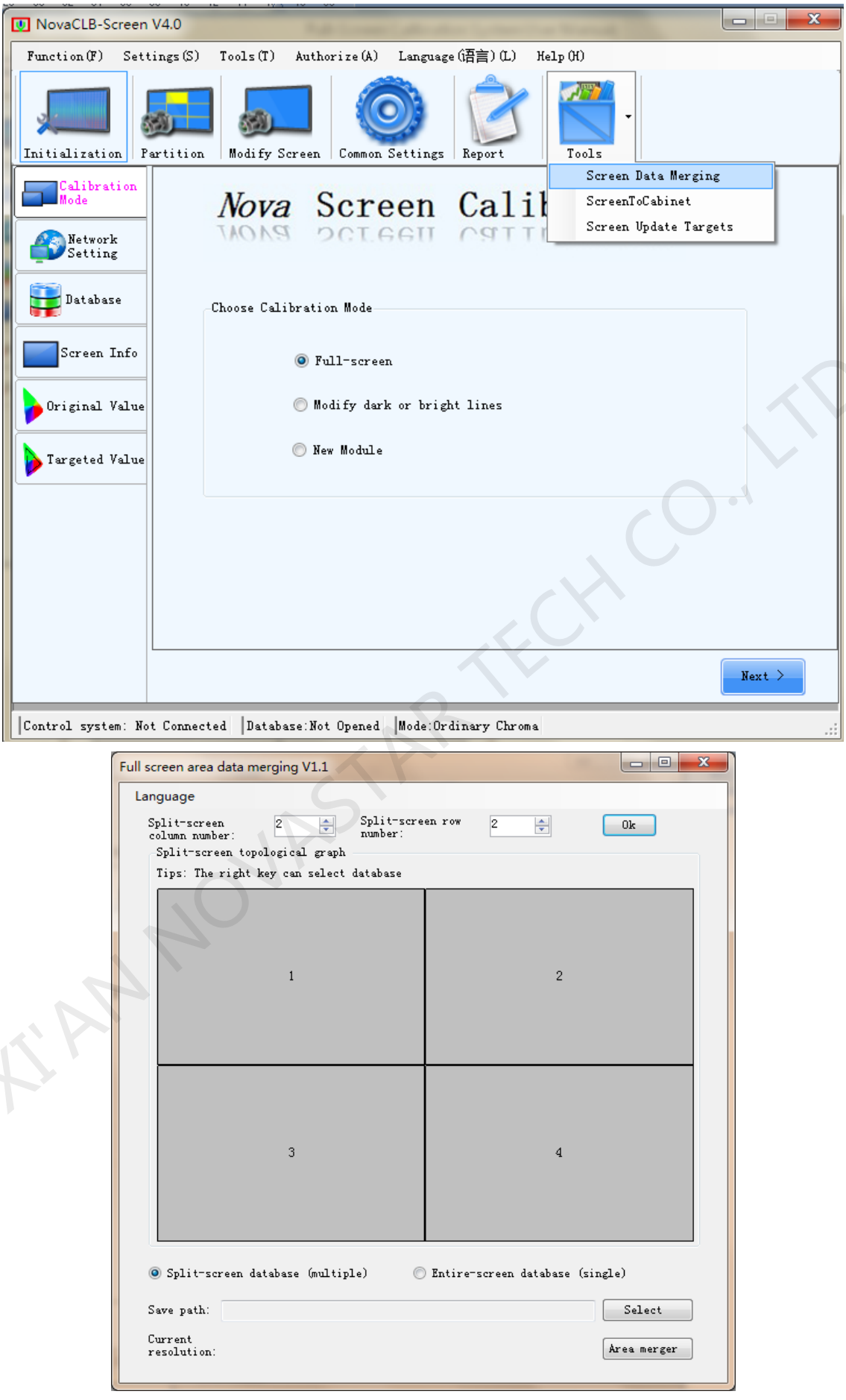


Fig. 7-1 Full screen region data merging

Select one of the regions, click right button of the mouse → "Select database", load the corresponding full screen database; after loading successfully, see the information related to the database; and load the full screen database corresponding to all regions according to the same procedures, as shown in the figure below.

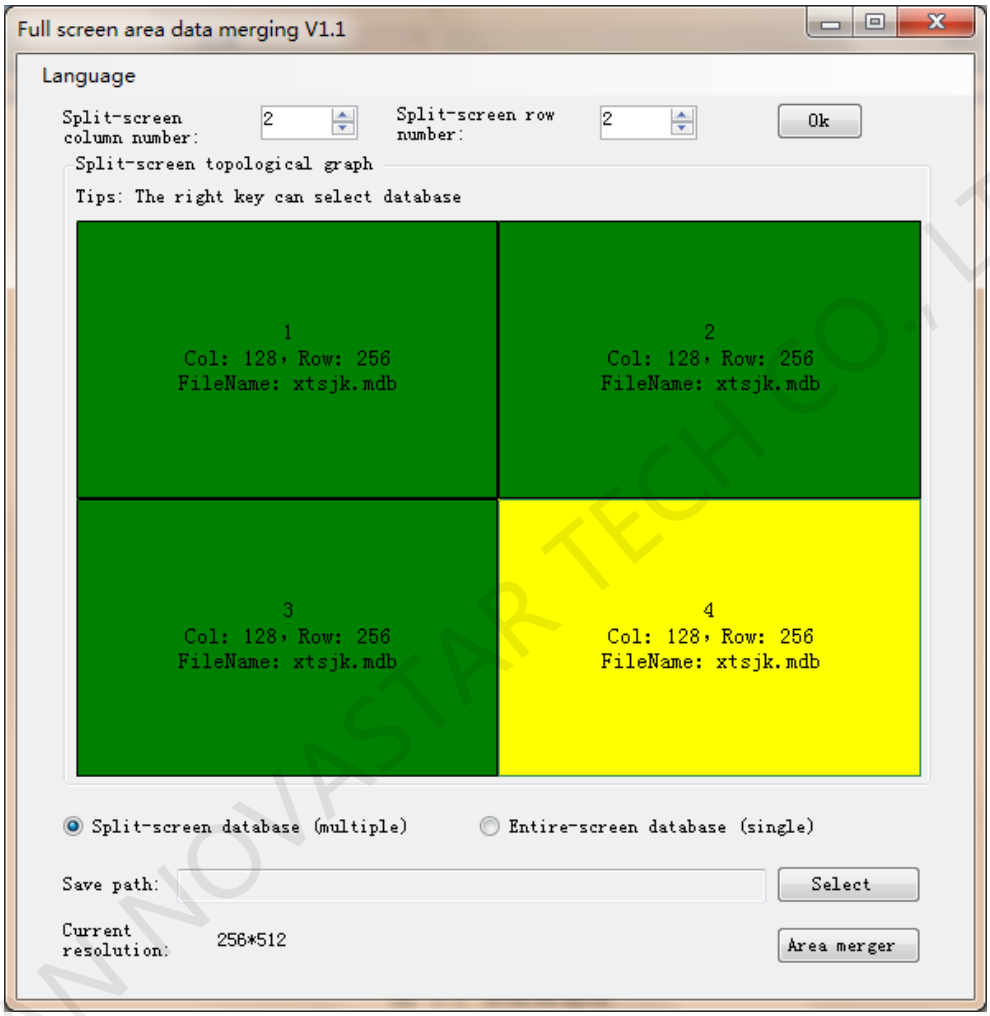


Fig. 5-2 Loading the database

Click "Select" to set the storage directory for the database generated after merging.

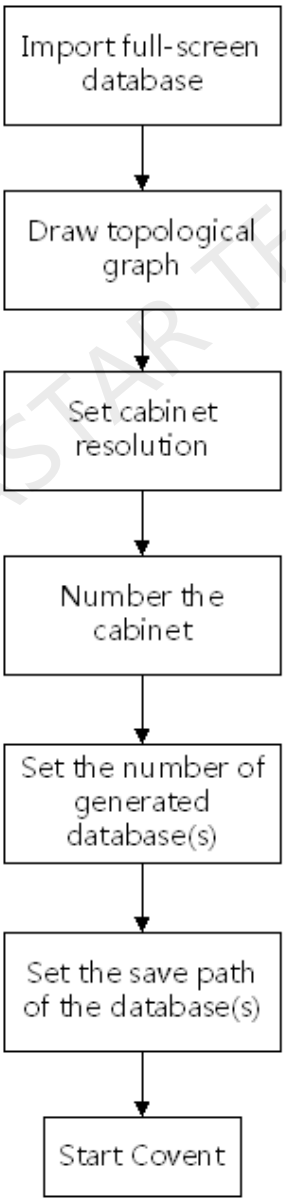
Pay attention to whether current resolution ratio of all regions are match to the full screen resolution or not; after confirming they are matched, click "Area merger".

If the option "Split-screen databases" is checked, four databases after merging will be generated; if the option "Entire-screen databases" is checked, one database will be generated after merging.

8 Full screen to cabinet

Full-screen converting cabinet software can switch the full-screen database into cabinet or module database according to a certain resolution. It can be switched to single database or multiple databases based on different needs.

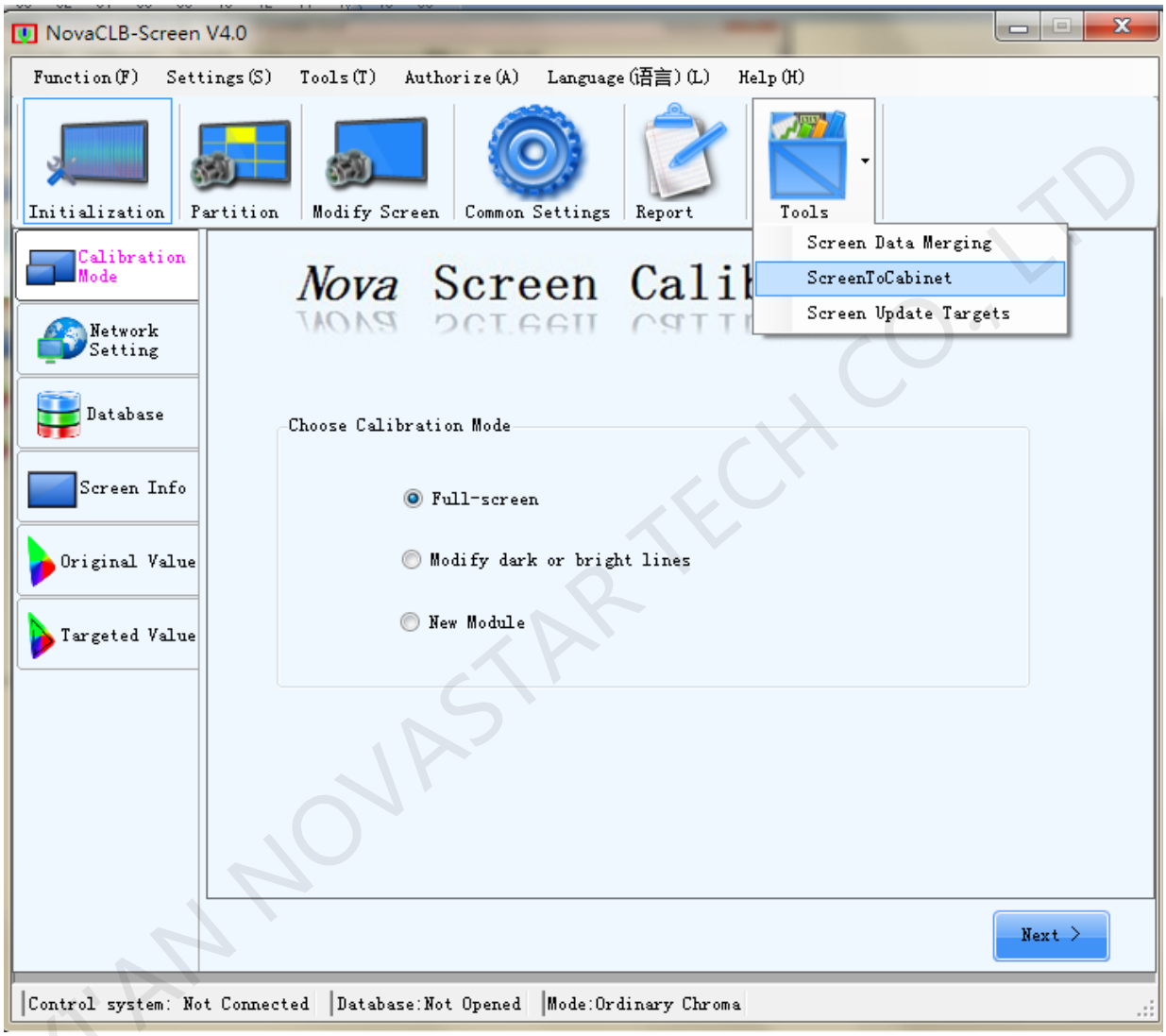
8.1 Operation procedure



8.2 Operation instruction

This chapter will illustrate operation steps of all procedures for users in detail.

8.2.1 Import database



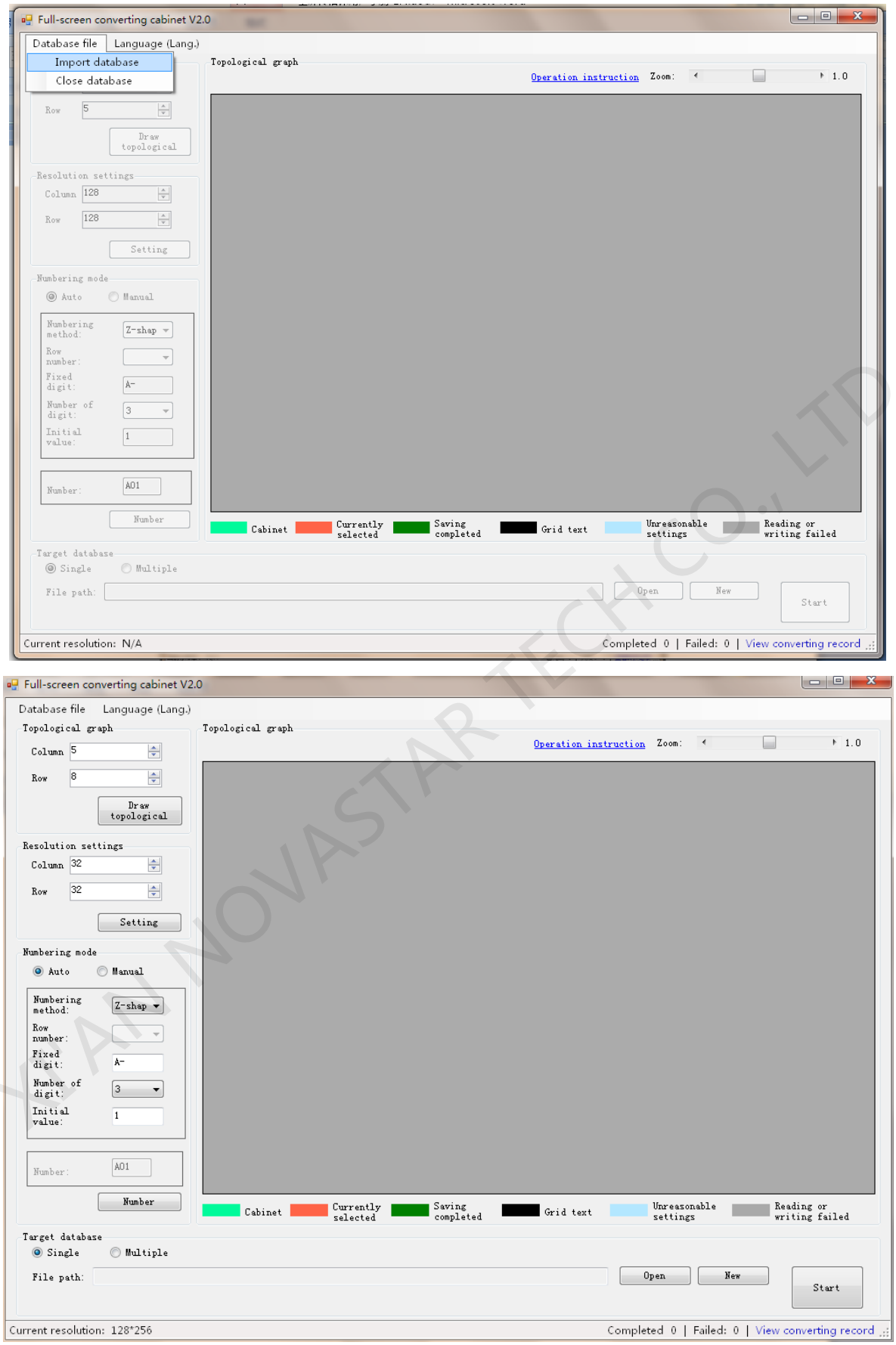
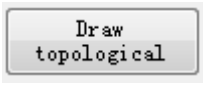


Fig. 8-1 Import Screen database

8.2.2 Draw topological graph

Set the number of rows and columns of the cabinet, and then click 

to generate a topological graph in the right window of the software.

Note that the sum of the resolution of all rows and all columns of the cabinet shall be equal to the resolution of the screen; therefore, under the premise that resolution of each cabinet is known, number of rows and columns of the cabinet shall be calculated accurately.

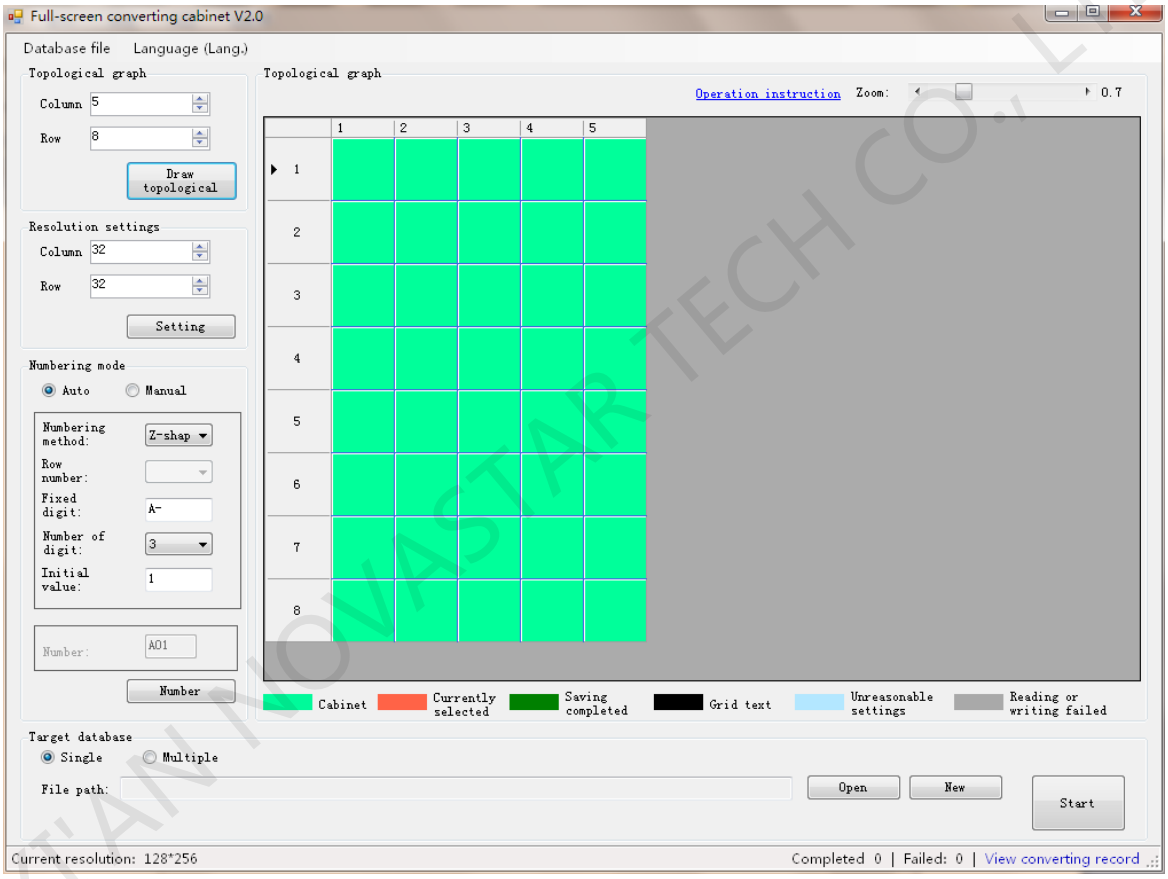


Fig. 8-2 Draw topological

8.2.3 Set resolution of each cabinet

First, select the cabinet which will be set in certain resolution, then set the resolution, and click 

.

The cabinets can have different resolution; however, for cabinets on the same row, rows of the resolution shall be the same, and for cabinets on the same column, columns of the resolution shall

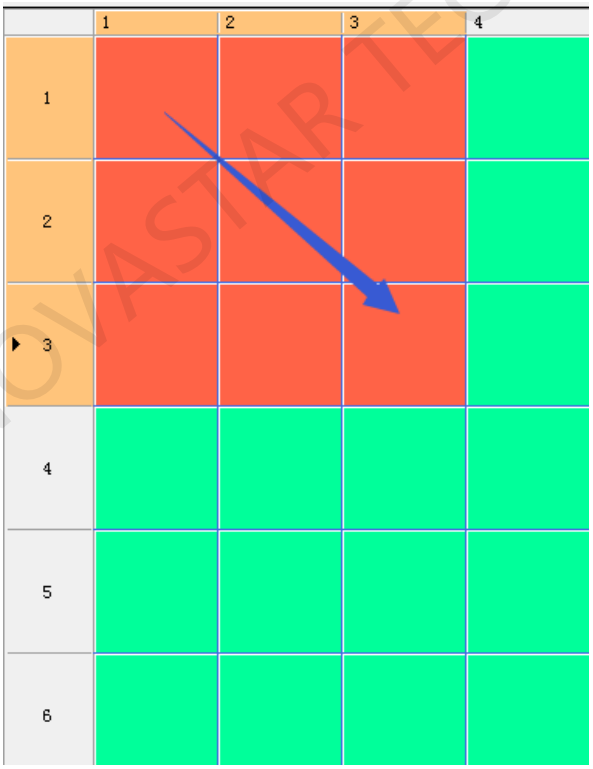
be the same; when the resolution setting is irrational, the color will appear; the sum of the resolution of all rows and all columns of the cabinet shall be equal to the resolution of the screen.

Instruction of the right-click menu of the cabinet:

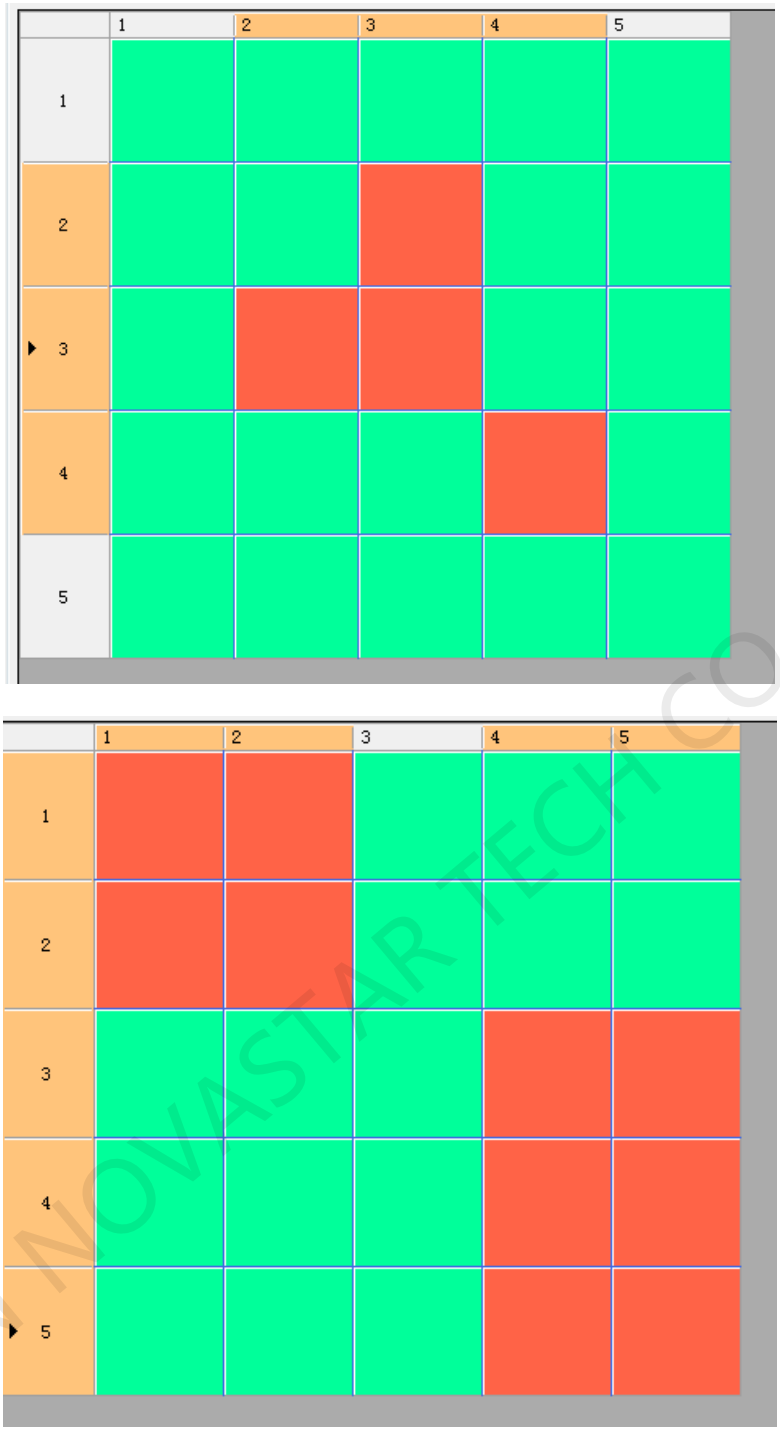
Right-click on the topological graph will show two options in the right-click menu, "Partition averagely" and "Clear settings". " Partition averagely": partition the resolution of the display averagely on the drawn topological graph of the cabinet with resolution of each cabinet being the same. "Clear settings": clear the resolution and cabinet name set on the topological graph.

The following methods can be used to select the cabinet:

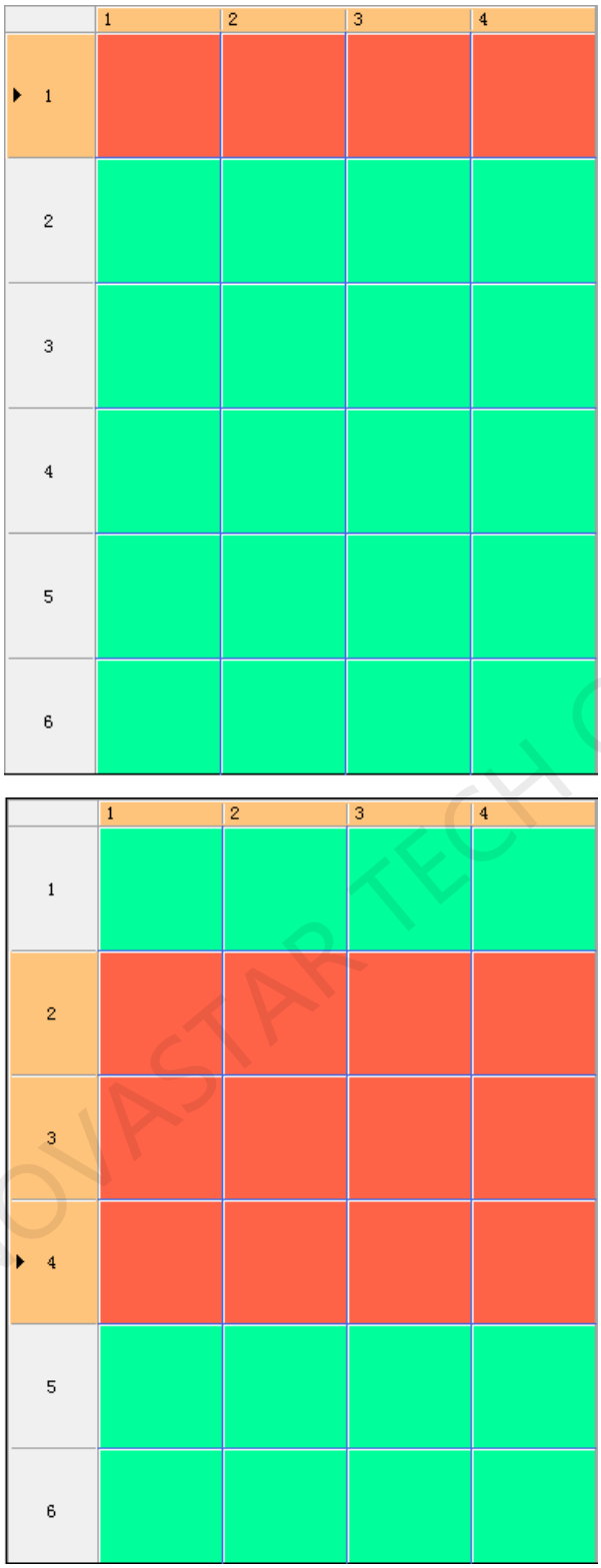
a) Select the first cabinet, hold down the mouse and drag according to the direction of arrow in the figure; the result is as follows:



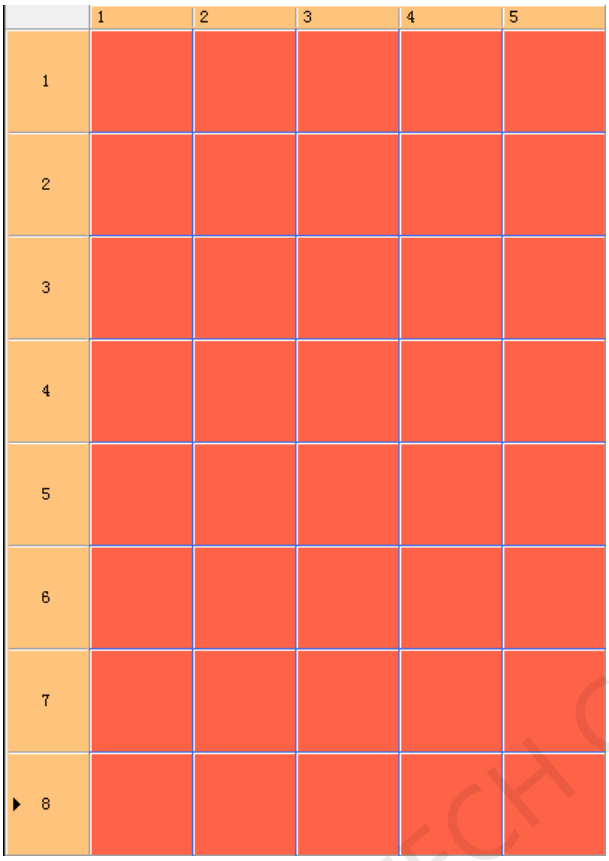
b) Press the "Ctrl" key to conduct multiple selections; the result is as follows:



c) Select one cabinet as the start, press the "Shift" key, and then select another cabinet as the end; in this way, the rectangular area from the start cabinet to the end cabinet can be selected; the result is as follows:



d) Press "Ctrl+A" to select all cabinets; the result is as follows:



The topological graph with set resolution is shown as follows:

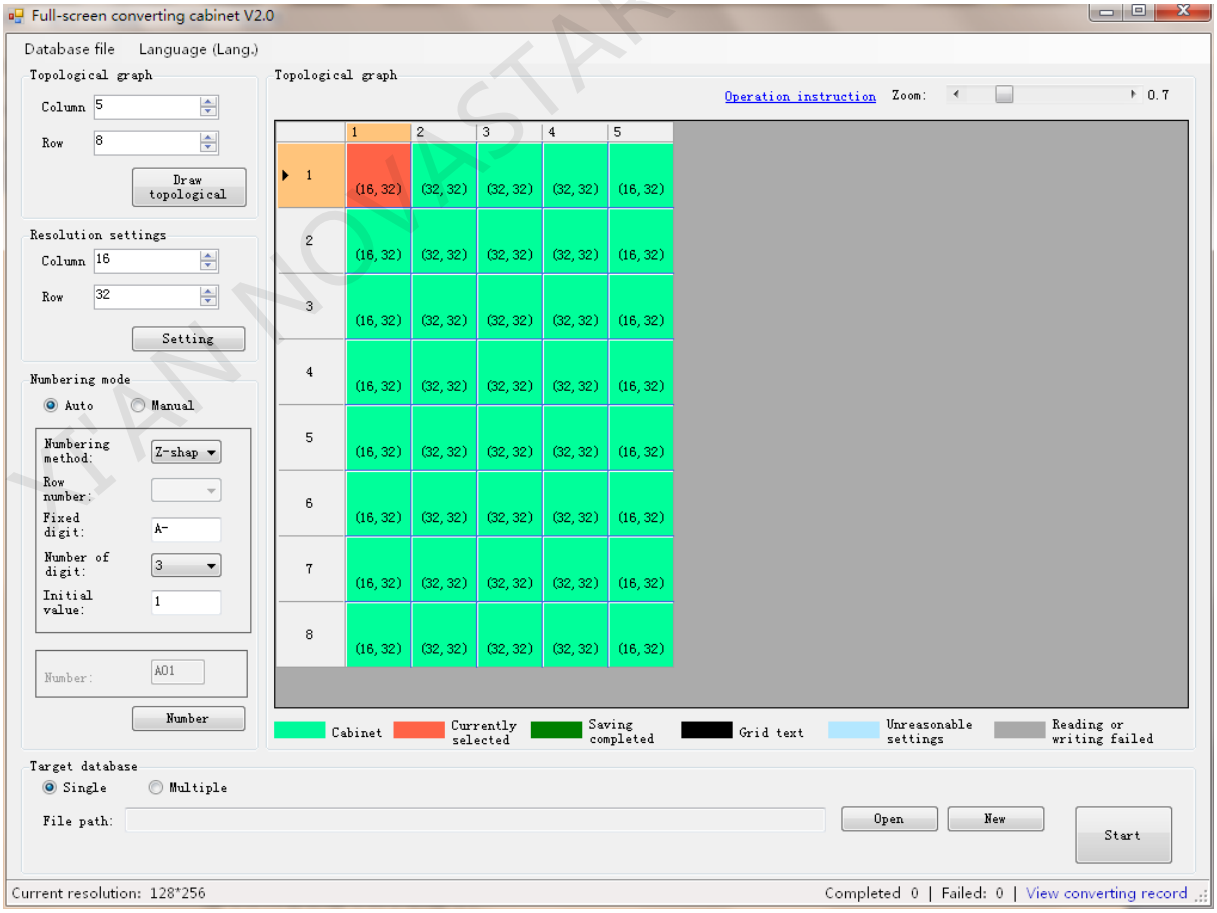


Fig. 8-3 Resolution setting

8.2.4 Number the cabinet

Numbering can be automatic or manual.

1) Automatic numbering

Check "Auto", select numbering method, row/column number, number of digit, and set fixed digit and initial value, and then click Number.

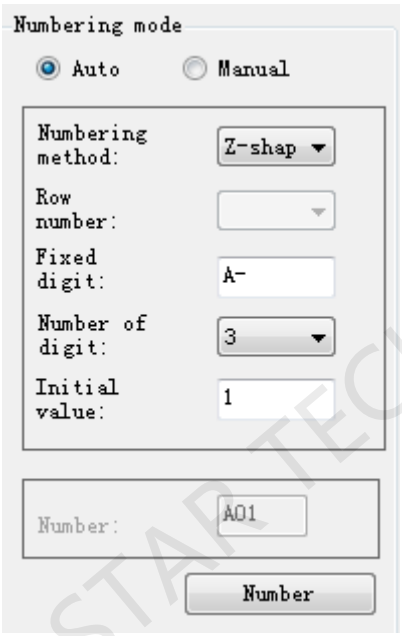


Fig. 8-4 Select Numbering mode

Numbering method: column direction, row direction, Z-shaped.

Row/column number: When selecting column direction and row direction, it needs to select the first row/column, the second row/column, the third row/column,....., the nth row/column, and number them respectively; the following figure is the topological graph after being numbered.

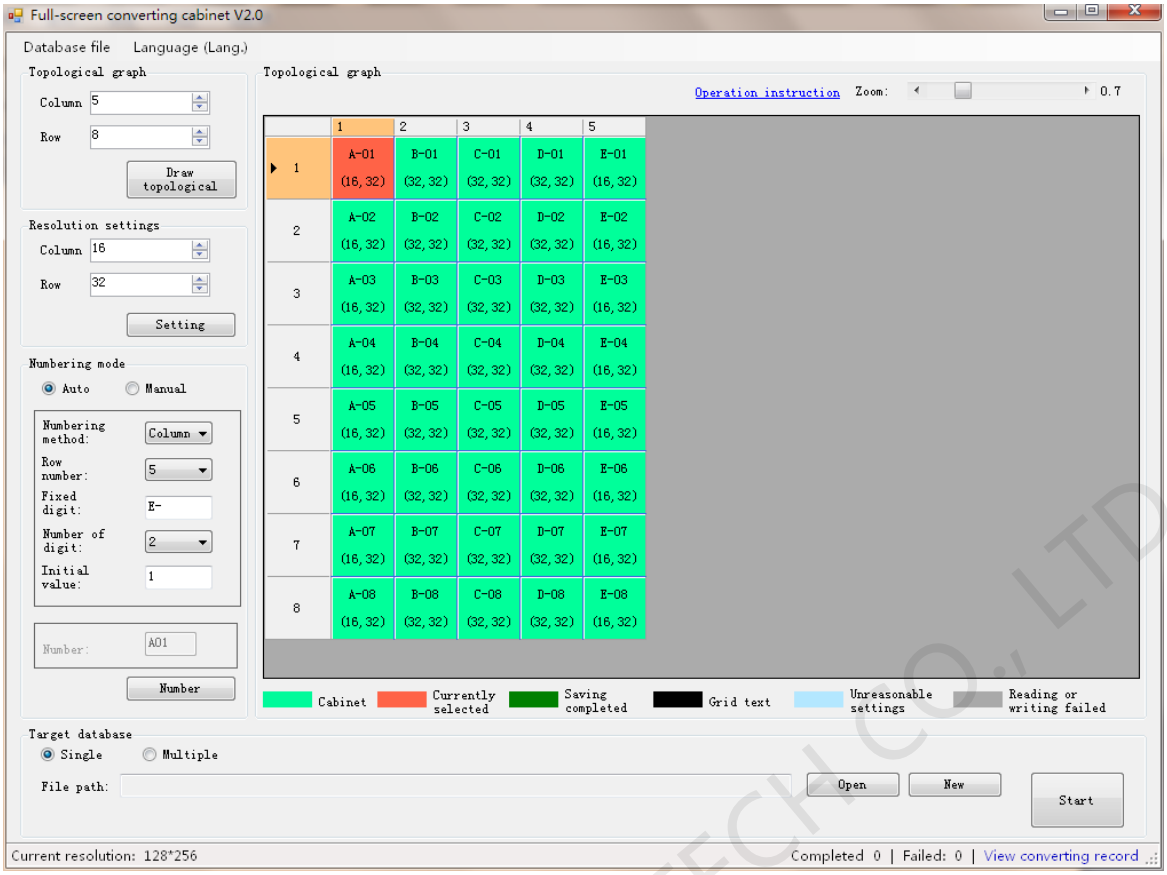


Fig. 8-5 Numbering according to row, column

If Z-shap is selected, there is no need to select row/column number every time; the software will number all the cabinets according to the Z-shap, as shown in the following figure:

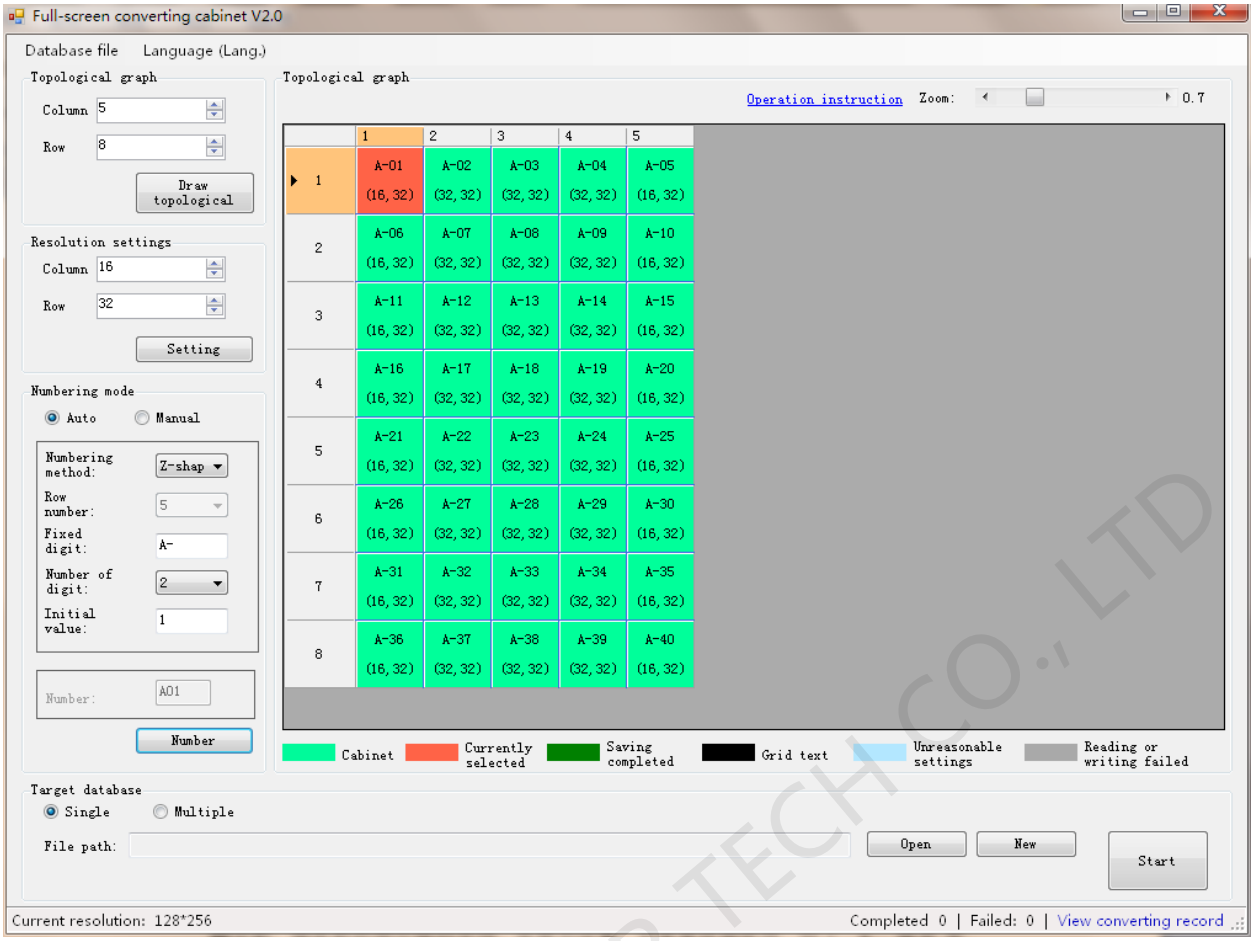


Fig. 8-6 Z-shap Numbering

Fixed digit: fixed numbering character at the beginning of the number which can be set by the user; it can be any character, for example, A-, B-, number-, etc.

Number of digit: number of digit for the number, 1-4 digits; as shown in the following figure, the numbers of the first and second column have 2 digits; the number of the second column has one digit; the fourth column has 4 digits; and the fifth column has 3 digits.

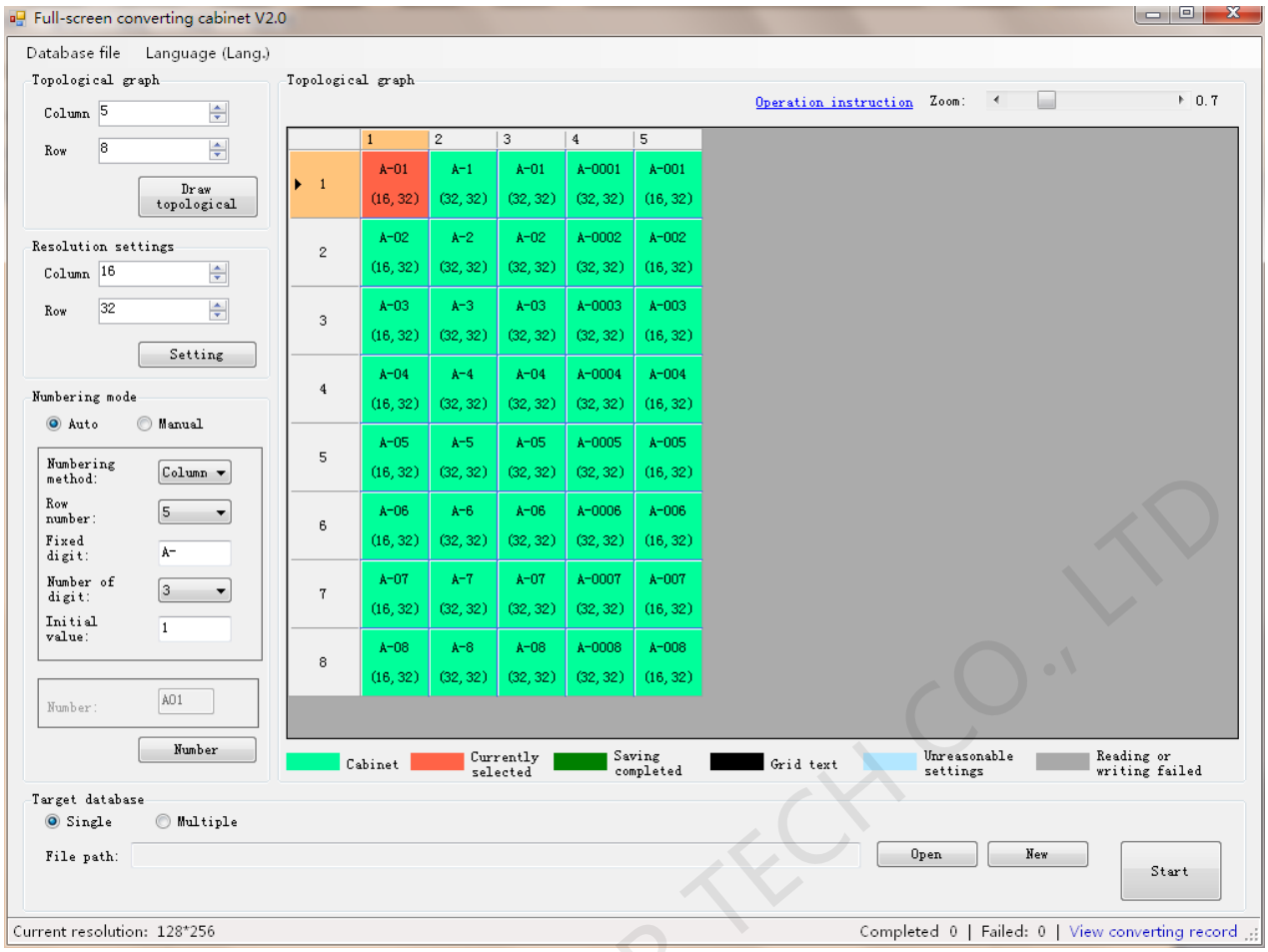


Fig. 8-7 Set the number of digit

Initial value: it means the initial value of the digit position in a single numbering process; for example, A-01 to A-08 can be used for the first column, and the initial value of the second column can be set as 9.

2) Manual numbering

Each time, number shall be entered manually; for example, enter the number A01, select the first cabinet, and then click Number to finish the numbering of the first cabinet; then enter A02, select the second cabinet, and then click Number to finish the numbering of the second cabinet; and the following can be done in a similar way to finish numbering of all cabinets.

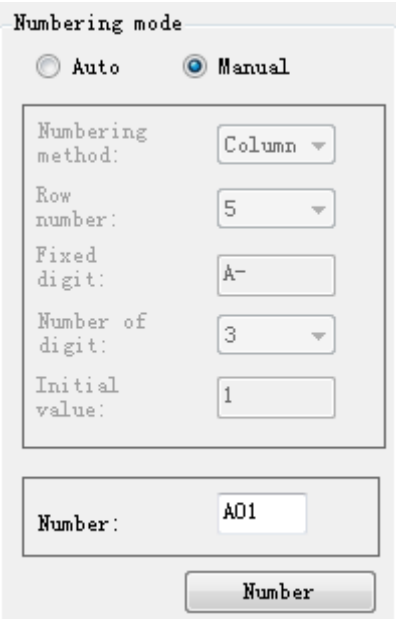


Fig. 8-8 Select Manual numbering mode

8.2.5 Set target database

There can be single target database or multiple target databases. For single target database, all cabinets or modules will be saved to one database and one database will be generated. For multiple target databases, single cabinet or module will be saved as one database, and multiple databases will be generated which are named after the number of each cabinet or module.

8.2.6 File path

In the case of saving as one single database, there are two situations. One is to save the cabinet data to the existing database which requires clicking Open to open the existing database. The other is to save the cabinet data to a new database, which requires clicking New to create a new database on some path of the computer.

In the case of saving as multiple databases, click Open to select the saving path of the cabinet database.

8.2.7 Switch

After completion of settings of all the options above, click 

.

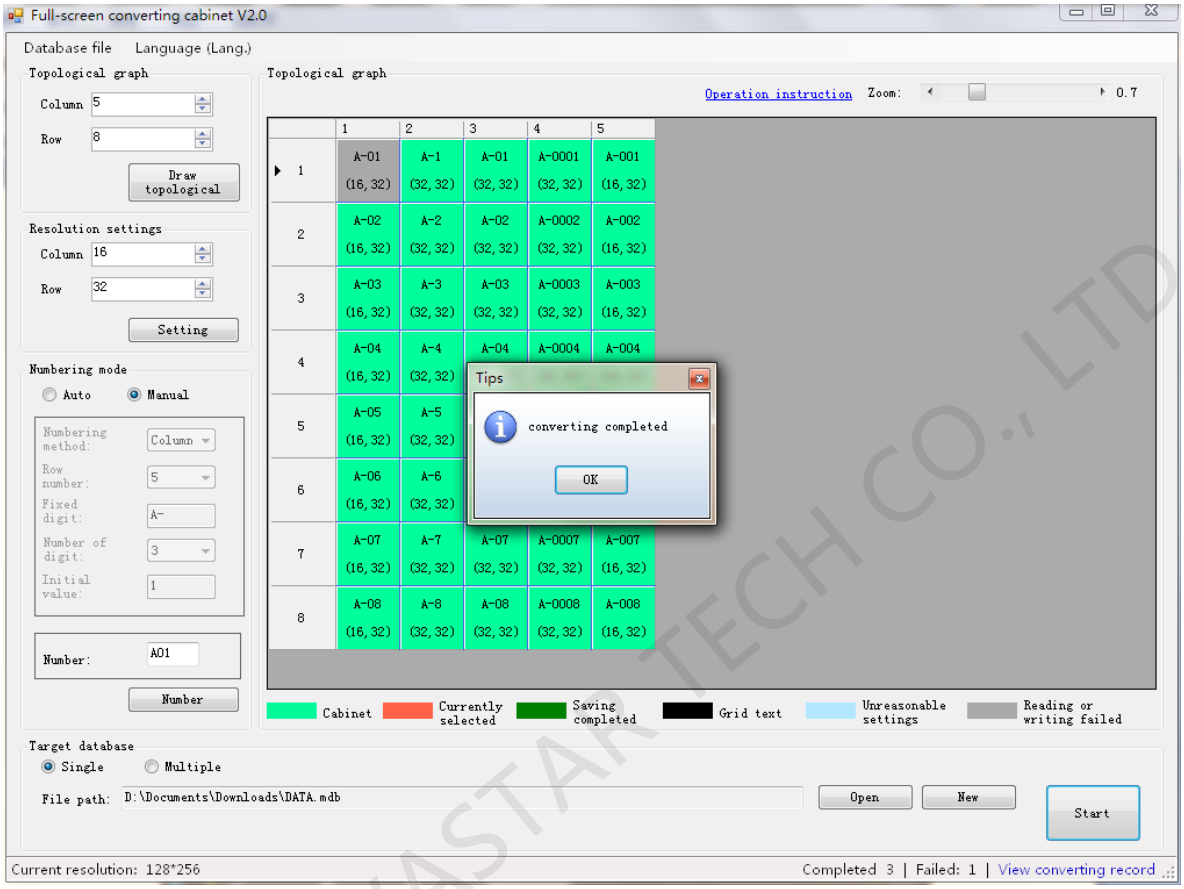


Fig. 8-9 Converting completed

9 Screen Update Targets

If the brightness and chroma of the full screen is not satisfactory after the calibration is completed, the full-screen target value can be modified through this function.

The operation is as follows:

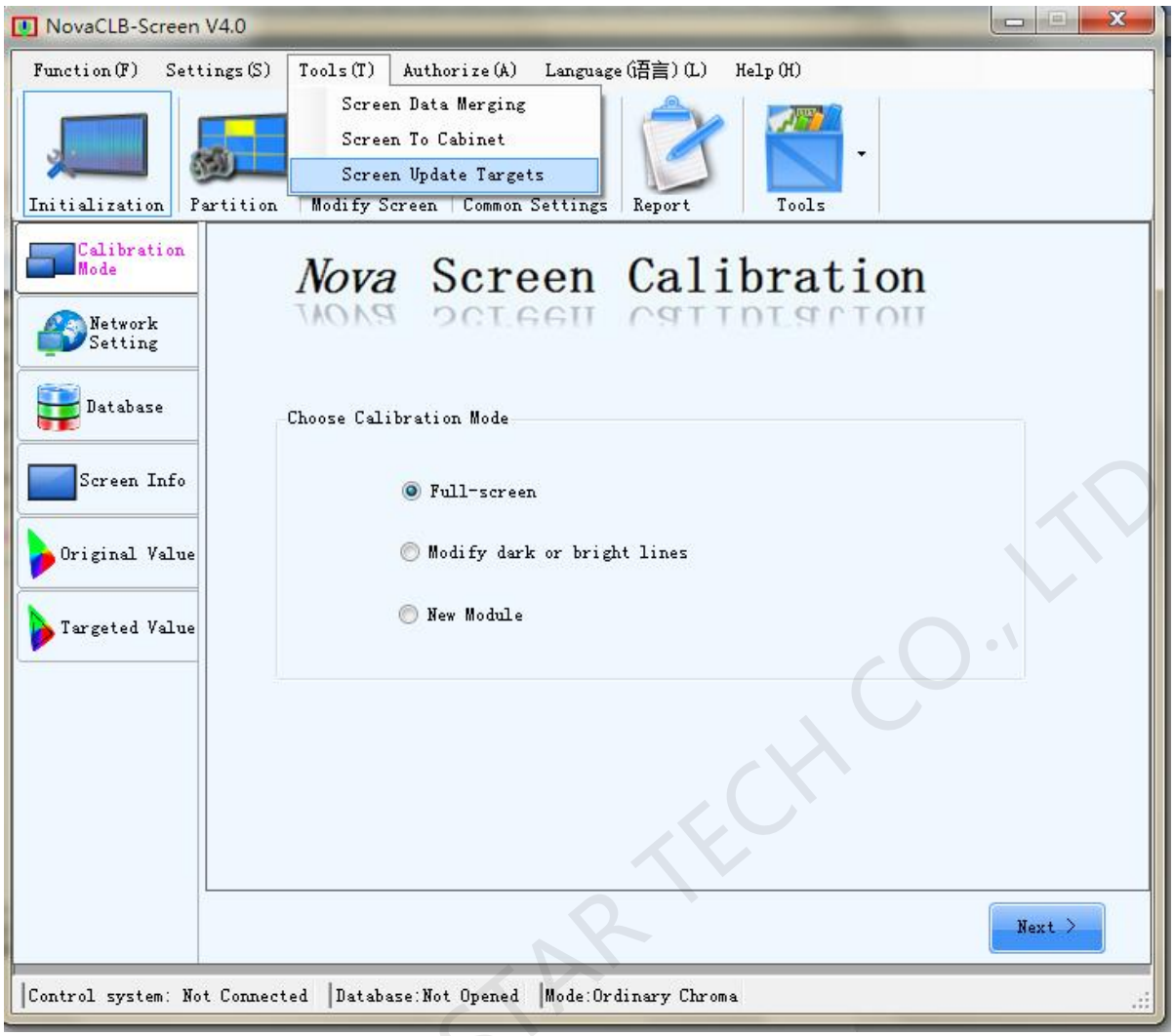


Fig. 9-1 Screen update targets

Click the first Broswer to import the original database, and click the second Broswer to set the route of the target database.

The modification method of the target value is the same the setting of "Expected brightness and chroma".

After the modification is completed, click Apply to save and apply the target value.

Click the first Broswer , It can be individually loaded into the database or project; after being individually loaded into the database, the colorimetric correction mode cannot be changed; after being loaded into project, the correction modes can be changed freely. then click the second Broswer to set the path of the target database.

The target value can be changed in the same way as the setting of "expected brightness and chroma".

After the change, click  to save the target value and apply.

Fig.9-2 Screen Update Targets

10 NovaCLB-Screen Help

10.1 Network Settings

If the distance between the calibration computer and the NovaLCT or NovaPro control computer is within 100m when performing calibration, Ethernet cables can be used to connect the two computers. Otherwise, wireless routers should be used.

Here TP-LINK WR941N will be taken as an example for illustrating how to configure a wireless

router for calibration application:

Fig. 10-1 The Wireless router TP-LINK WR941N

1) Connect the wireless router with the control computer through the network cable into the yellow interface.

Fig. 10-2 Ports for Connection

2) Enable the wireless networking capabilities of calibration computer to connect to wireless router.

Pay attention, whether use network cable or wireless router, you need to set the IP of the two computers and the default IP of wireless when calibrate with NovaLCT, and you need to set the IP of calibration computer , NovaPro , and the default IP of wireless when calibrate with NovaPro. you need to set the IP of the two computers and the default IP of wireless router to be within the network segment.

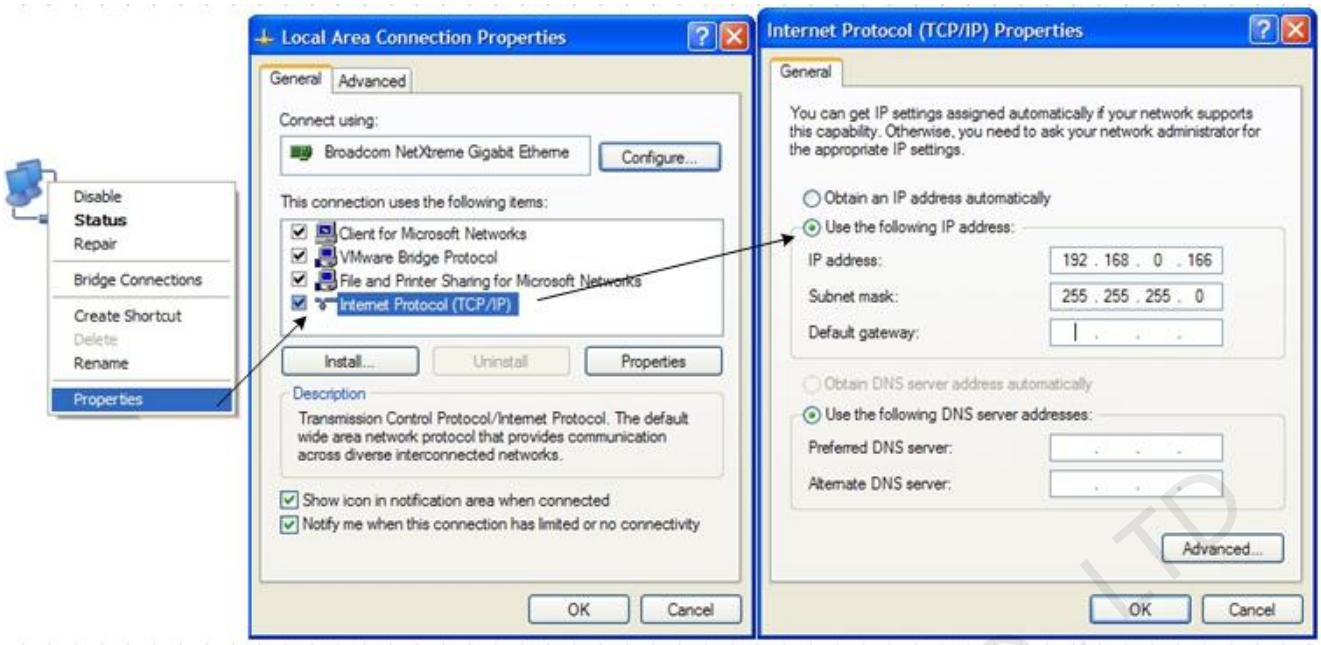


Fig. 10-3 IP Configurations

10.2 LCT Monitor Settings

Ensure that network is normal, then users need to open NovaLCT-Mars, and choose advanced users, the pass word is 666, as shown in fig. 10-4

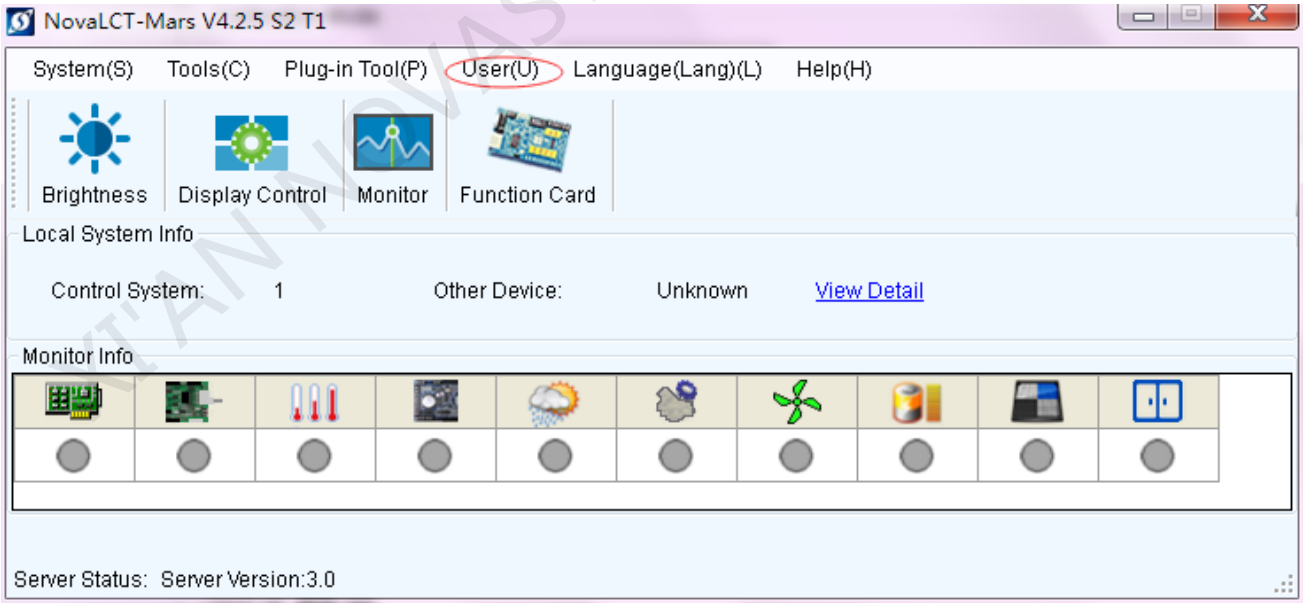


Fig. 10-4 LCT Main Interface

After loading by advanced user, NovaLCT-Mars toolbar will appear calibration options, click into the calibration page.

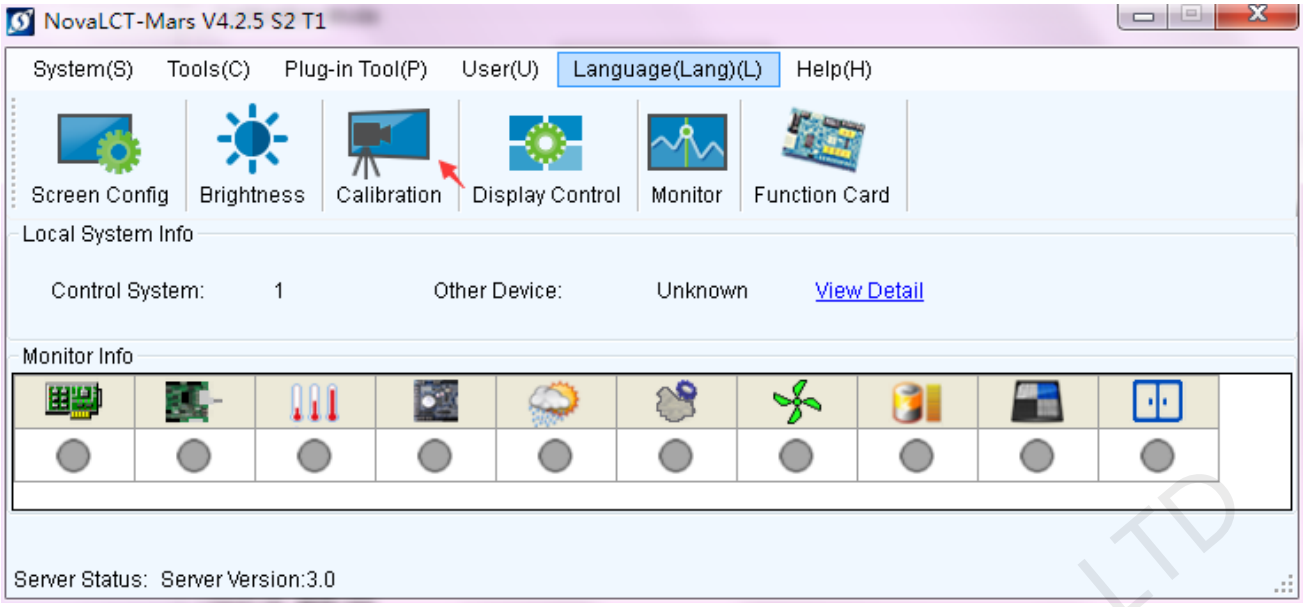


Fig. 10-5 Calibration Page

After getting into the calibration page, please check the network settings to make sure network normal, then click "Reconnect". The message of "Listening succeed" shown in the following message window indicates that calibration service has been activated, if not, please check the network.

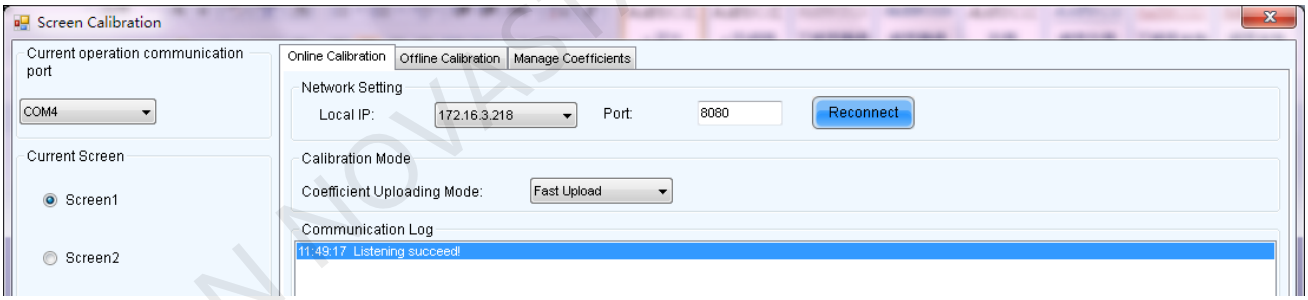


Fig. 10-6 Enter into Calibration Mode

10.3 Principle of Brightness and Color Calibration

Generally speaking, it is recommended that users select brightness and color calibration mode, they can obtain higher uniformity. For some customers demanding more colorful and brighter, they can choose brightness calibration only.

Brightness calibration: Brightness calibration is to adjust the brightness of LED lights to improve

the brightness uniformity. In the brightness calibration, brightness of most lights will be properly lowered. Fig.10-7 shows an example of brightness adjustment of green LED lights, in which there are two brightness distribution curves corresponding to before and after calibration (adjustment) respectively. Before calibration, the brightness values of green LED lights are scattered between 2400 – 3300 cd/m², but after calibration those are concentrated almost at 2500 cd/m², representing high brightness uniformity.

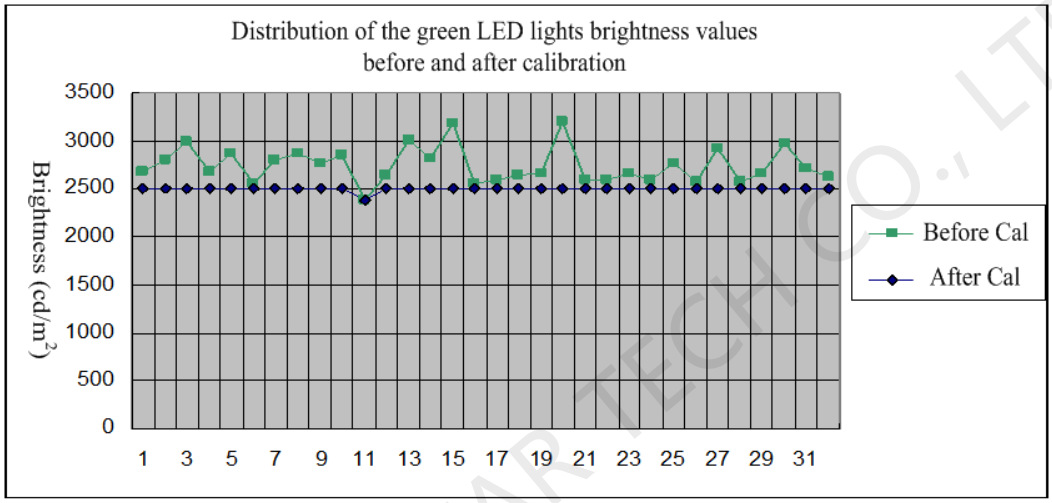


Fig. 10-7 Brightness Values Distribution Before and After Calibration

Brightness and color calibration: Brightness and color calibration is based on the theory of RGB color match. It adjusts the coordinates of LED lights in the RGB color coordinate system to reduce the color diversity. As shown in Fig.10-8, the large triangle is the gamut of a LED display before calibration , while the small one is the gamut of same LED display after calibration. The R, G and B color coordinates of LED lights scatter in relative large areas when before corrected while those after calibration are concentrated, which represents high color uniformity.

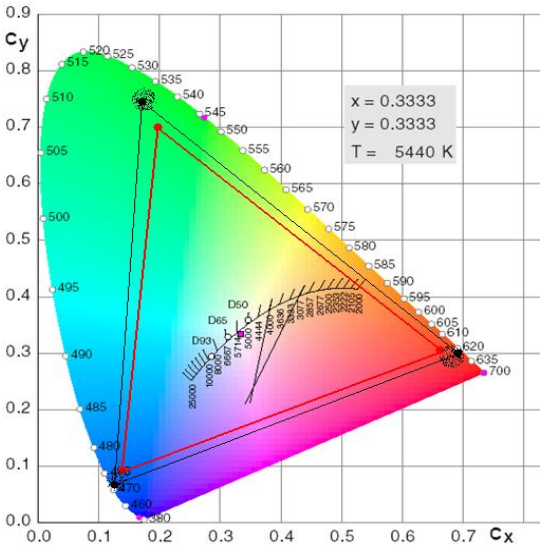


Fig. 10-8 Gamut of A LED Display Before and After Calibration

Note that when performing the brightness and color calibration, proper coordinates for R, G and B should be chosen in order to avoid color distortion.

10.4 Camera Operating Skills

Camera Preparation:

Use a USB cable to connect the camera to the computer. Set the camera to "ON." Click "Connect to camera." After "Connected" is displayed, users can automatically control the camera using the software.

Set the mode dial  to "M" (manually) and lens focus  to "M" (manually). If the lens supports the anti-shake function ("OS" on Sigma cameras), set  to "OFF."

Switchover between eyepiece framing and LCD framing: Enable "Live view shoot" in "MENU" of the camera and press  to switch between eyepiece framing and LCD framing.

Tip: When LCD framing is enabled, users can press  to switch among original size,

five times the original size and ten times the original size for images. 

Adjustment of the Camera Saturation:

Click "Analyze." The software automatically calculates the saturation. Adjust the aperture size, time of exposure and calibration brightness value to enable the saturation to be normal. The saturation value ranging from 60 to 100 is normal, and the area value ranging from 50 to 150 is fit. The adjustment principle is as follows: the adjustment must be conducted in the following order: aperture size > time of exposure > calibration brightness value. Generally, the aperture value is inversely proportional to the saturation, and the time of exposure and brightness are directly proportional to the saturation. After the red (R) saturation, green (G) saturation and blue (B) saturation are normal, click "Confirm configuration."

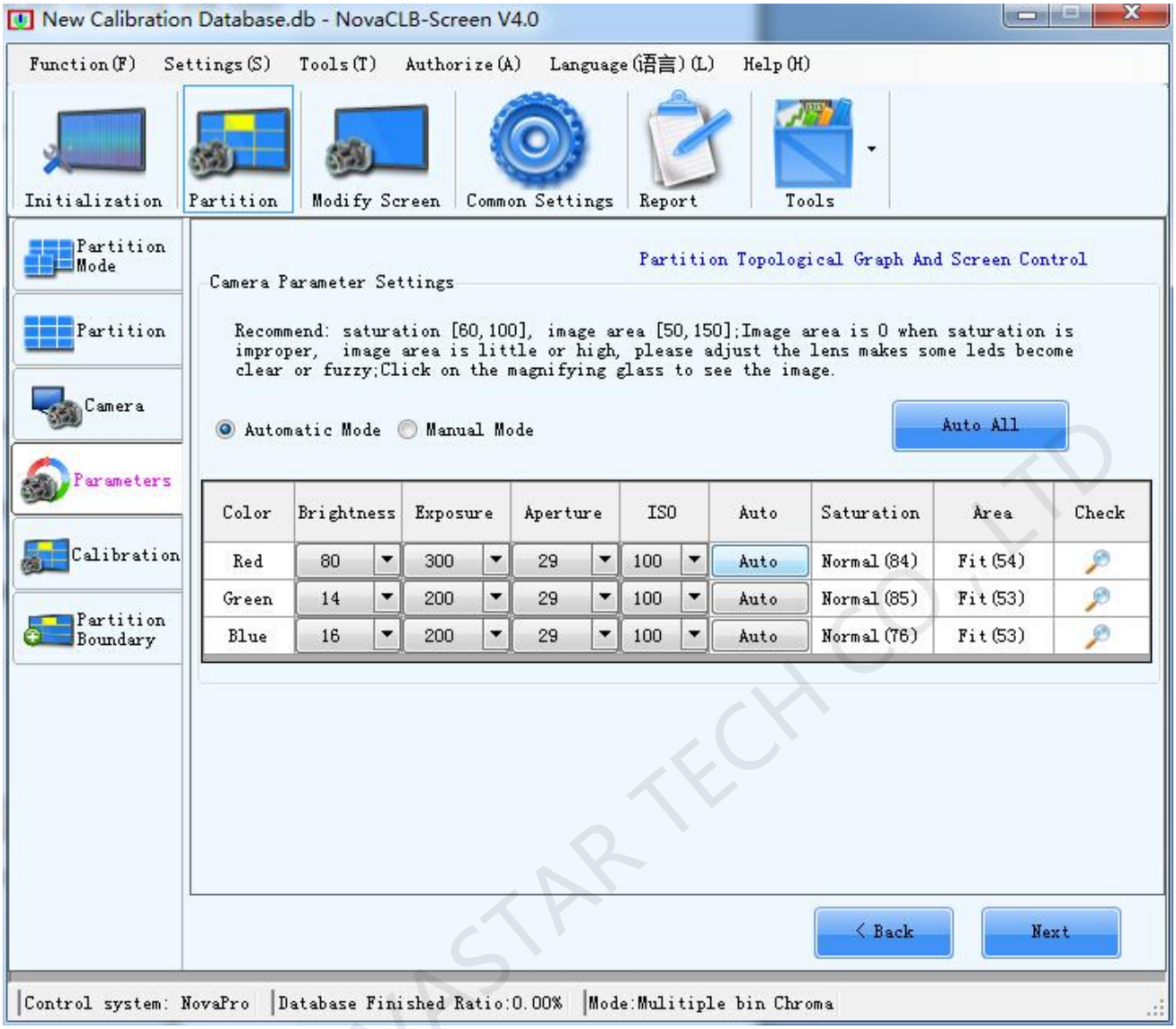
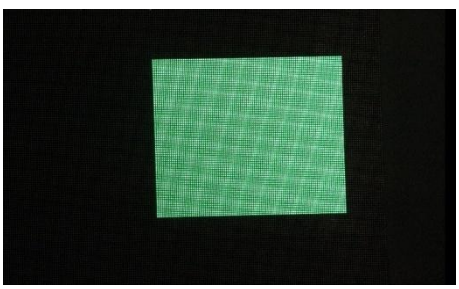


Fig. 10-9 Camera Parameters Adjustment

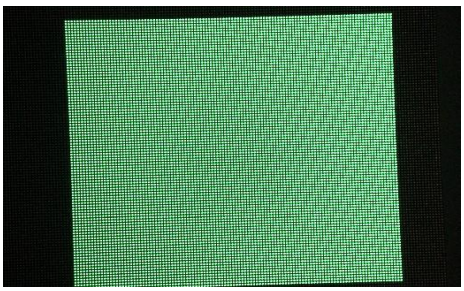
10.5 Subarea Imaging Operating Skills

Manage the camera aim at the subarea to be calibrated and adjust lens focus length, so that the image of the subarea has a proper view.

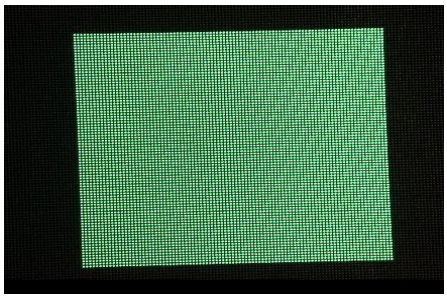
Because of the outer part of the lens decreases in imaging quality, the direction of the camera should be adjusted to ensure the subarea image is at the center part of the whole image. And the size of the subarea image should be about 4/5 of the whole image size. That is to leave 1/10 of the whole image at sides, as shown in Fig 10-10.



(a)Subarea Image Too Small



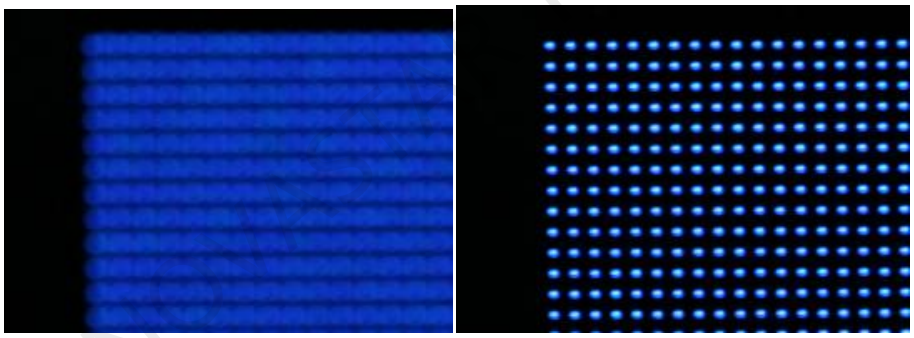
(b) Subarea Image Too Large



(c)Suitable Subarea Image Size

Fig. 10-10 Imaging of A Subarea

Adjust focus length for clear image, as shown in Fig 10-11



(a) Blur Image (b) Clear Image

Fig. 10-11 Focus for Clear Image

For factory calibration, it is not recommended to use the maximum lens focus length . Because the pixel size is less than the supported maximum subarea size, the suitable focus length is that makes the cabinet view centre is at the center of the whole view.

10.6 Large partition operating technique

When selecting large partition calibration, the camera can calibrate maximum partition of

2240X1500.

The partition photographed at one time with the camera is equivalent to the number of columns of single partition pixels dividing unit columns multiplying the number of rows of single partition pixels dividing unit rows, due to camera limitation, the number of unit and single partition pixels set shall better satisfy the following conditions:

The number of columns of single partition pixels dividing unit columns shall be less than 224;

The number of rows of single partition pixel dividing unit rows shall be less than 150;

10.7 Steps to Check Calibration Effects

It may occur unsatisfactory calibration effects in some areas of screen after calibration, then troubleshoot according to calibration effect is needed. Before checking, users should know how to check "Camera Image Collection".

Click magnifying glass icon  in Partition calibration page, then measurement image page appears. First, observe the image resolution and integrity, second, observe whether all led points have been selected. As shown in Fig.10-12:

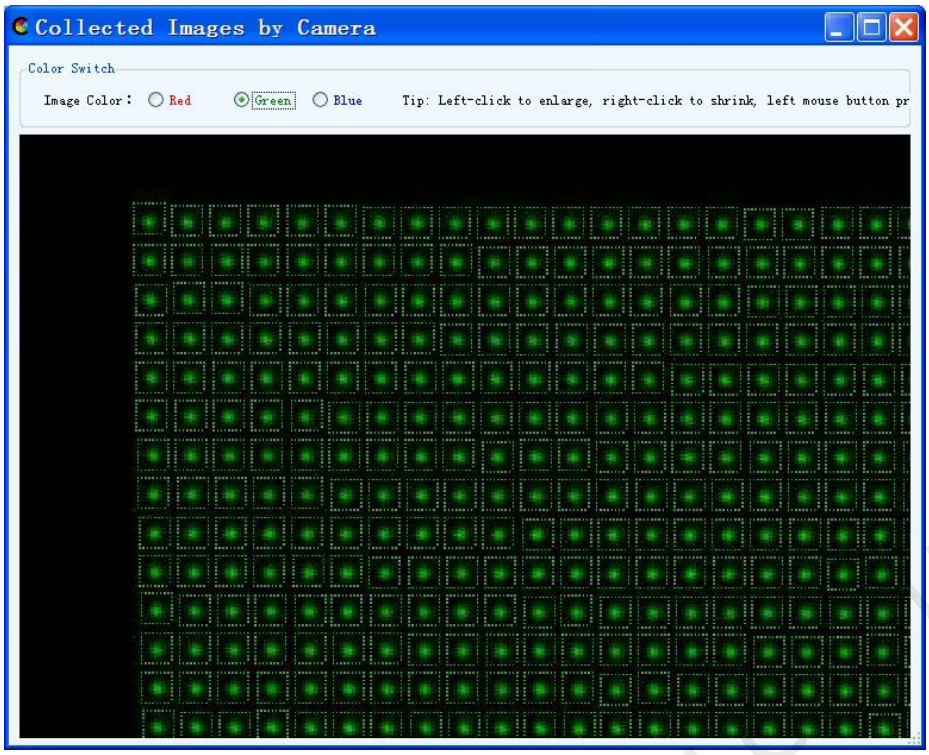


Fig. 10-12 View of Collection Images

Screen fuzzy phenomenon1: there appears some bright or dark wirings in vertical direction between subareas.

Analysis: Generally speaking, it is because of poor quality of imaging, users may check whether LED image clear or not on "Camera Image Collection". Generally both Oversize resolution when partition setting and not clear focus when the imaging may lead poor quality of imaging.

Screen fuzzy phenomenon2: there appears water ripples in subareas

Analysis: Generally speaking, it is because of inadequate sampling. Show red, green and blue image on LED screen after calibration to find out undesirables color. Slightly adjust the focus or re-focus, then repeat the calibration of the color, you can solve the problem.

Moreover, some scene reasons may also lead unsatisfactory, for example, outside light interference, lens jitter by site windy and imaging fuzzy by rain and snow. In order to reach the most ideal effect, engineers need to avoid these influences of external environment.

10.8 Water Ripple in Full-Screen Calibration

Full-screen calibration may appear full screen of a color rendering water ripple, blue share the highest frequency. This is due to that the display resolution is too large, and the relative lack of camera resolution leads the low sampling frequency. It is known as moiré patterns phenomenon in optical imaging.

Try below resolutions to solve this problem, and then collect R/G/B again.

Change camera angle. Rotate camera lightly to change its angle to eliminate or reduce the existing moiré patterns.

Change camera position. Move camera up or down or left or right to reduce moiré patterns.

Change camera focusing. Too clear focus and details may cause moiré patterns, please adjust camera aperture to reduce camera focus Clarity, furthermore to reduce moiré patterns.

Change camera lens. Try different focus length to reduce or eliminate moiré patterns.

Try to divide the full screen into several parts to perform calibration when performing full screen correction. The reduction of imaging points can help eliminate Moiré Effect.

11 Edition Statement

Edition	Issuing Date	Corresponded Software Version
User Manual of NovaCLB-Screen Full Screen System-V1.0	25/09/2012	First Release
User Manual of NovaCLB-Screen Full Screen System -V2.0	19/12/2012	NovaCLB-ScreenV1.9.0
User Manual of NovaCLB-Screen Full Screen System -V2.2	06/09/2013	NovaCLB-ScreenV2.0.0
User Manual of NovaCLB-Screen Full Screen System -V3.1.0	07/03/2014	NovaCLB-ScreenV3.1.0
User Manual of NovaCLB-Screen Full Screen System -V3.2.0	08/04/2014	NovaCLB-ScreenV3.2.0
User Manual of NovaCLB-Screen Full Screen System -V3.3.1	01/26/2015	NovaCLB-ScreenV3.3.1
User Manual of NovaCLB-Screen Full Screen System -V3.4.0	04/21/2015	NovaCLB-ScreenV3.4.0
User Manual of NovaCLB-Screen Full Screen System -V4.0.0	09/22/2015	NovaCLB-ScreenV4.0.0